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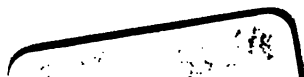
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15 & 16 VICTORIÆ, Cap. 83. Sec. XXXII.



CHRONOLOGICAL AND DESCRIPTIVE INDEX
OF
PATENTS APPLIED FOR AND PATENTS GRANTED,
CONTAINING
THE ABRIDGMENTS OF PROVISIONAL AND
COMPLETE SPECIFICATIONS
For the Year 1873 ;
ALSO
ALPHABETICAL AND SUBJECT-MATTER INDEXES
For the same Period.

Printed and Published by Order of the Commissioners of Patents

UNDER THE

ACT of 15 & 16 VICTORIÆ, Cap. 83. Sec. XXXII.

BY BENNET WOODCROFT, F.R.S.,

CLERK TO THE COMMISSIONERS OF PATENTS.

LONDON:

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1874.

P R E F A C E.

PREVIOUS to the year 1867 the Abridgments of Specifications were published in classes only; and after the publication of the first volume of a class, bringing the Abridgments down to a particular date, considerable time necessarily elapsed before the appearance of the second part or continuation of the class. To obviate the inconvenience thus occasioned, the Commissioners of Patents made the following rule:—

After the 31st day of December 1866, every applicant for Letters Patent shall deliver at the Office of the Commissioners, with his provisional specification, or (when a complete specification is filed with the petition and declaration) with his complete specification, an abridgment, in duplicate, under his hand or the hand of his agent, of such provisional or complete specification. The abridgment must set forth the name of the applicant, the title of the invention, and describe, in as short a manner as possible, the features of novelty which constitute the invention. The abridgment and the copy thereof must be written upon sheets of foolscap paper, and upon one side only of each page, leaving a margin of one inch and a half on the left-hand side of the page.

The Commissioners also directed that the Abridgments so delivered should be printed and published in the following manner, as explained in their Report to Parliament for the year 1866:—

“These abridgments will be printed and published in quarterly volumes after the expiration of the six months’ protection. Thus the abridgments delivered at the office in the quarter ending 31st March will be ready for printing in the quarter ending 30th September, and the volume will be published in the ensuing quarter. The volumes will be of the same size as the chronological, alphabetical, and subject-matter indexes (imperial 8vo.), and constitute in fact a fourth kind of index, viz., a descriptive index in a chronological form. It is also intended to publish these abridgments from time to time in classes, according to the plan which has been in operation from the year 1856.”

The publication of the Descriptive Index accordingly commenced in 1867. In the volumes for the years 1867 and 1868, the correct title of the Invention is prefixed to each Abridgment, and also the name of the communicator, when the invention has been communicated from abroad, and a notice if Letters Patent have not been granted or are void for want of a Final Specification. The Abridgment itself is printed exactly as furnished by the applicant for Letters Patent; no attempt being made to correct errors in spelling or grammatical construction, or to supply words which have been omitted (except in cases where the words omitted from the original Abridgment are to be found in the copy).

In the volume of this Index for the year 1869, all the information previously furnished in a separate form by the Chronological Index was given (as well as an Alphabetical Index of Names); the title was changed to “Chronological and Descriptive Index of Patents applied for and Patents granted;” and the Chronological Index ceased to appear as a distinct publication.

In consequence of the receipt of a memorial signed by a large number of patentees, manufacturers, and literary and scientific men, the Commissioners of Patents decided that the Abridgments delivered after the 1st January 1871 should be published weekly (instead of quarterly), with Indexes of Persons and Subjects. The Chronological and Descriptive Index for 1871, with Indexes of Names and Subject-matter, accordingly commenced in a weekly form on the 14th July 1871; and the Alphabetical and Subject-matter Indexes ceased to appear as distinct publications. The Indexes for the years 1872 and 1873 have been printed and published in like manner. The notices which were prefixed to the Abridgments in cases where Letters Patent had not been granted or were void for want of a Final Specification have been discontinued, as, on account of the early publication of the Abridgments, the information could not in every case be given; but this information will be found in the copies of the Specifications which are subsequently printed. In the body of the work the Abridgments of the Provisional and Complete Specifications are published in regular numerical order in the week after the expiration of the term of *six months from the date of application*. But each weekly number has an appendix, containing the Abridgments open to public inspection before the expiration of the term of six months (in consequence of the Patentees having filed their Final Specifications), and also the Abridgments of Complete Specifications just received. These Abridgments are subsequently printed in the body of the work in their proper places, in order to preserve the numerical and chronological arrangement of the book. The Indexes of Names and Subject-matter refer to the Abridgments in the appendixes, as well as to those in the body of the work. Hitherto in the indexes of each successive number all the previous indexes have been incorporated until the end of the year, and then with the last No. [52] the complete Alphabetical and Subject-Matter Indexes for the year have been published, to be bound with the fifty-two weekly parts in one volume. This practice will be followed with the Subject-matter Index for the year 1874, but with the Index of Names only to the publication of the 30th or 31st No., when the Alphabetical Index for the whole year will be published. The appendixes are not to be bound with the volume, as the Abridgments which they contain ultimately appear in the body of the work.

B. WOODCROFT.

July, 1874.

CHRONOLOGICAL AND DESCRIPTIVE INDEX
OF PATENTS APPLIED FOR AND PATENTS GRANTED,

CONTAINING THE

ABRIDGMENTS OF PROVISIONAL AND COMPLETE SPECIFICATIONS

Delivered from January 1 to January 4, 1873.

A.D. 1873, January 1.—No. 1.

HARRISON, CHARLES WEIGHTMAN, of High Holborn, in the county of Middlesex, gentleman.—“Improvements in treating certain gases for lighting and heating purposes, and in combining atmospheric air therewith.”

The novelty of this invention consists in carburetting or increasing the proportion of carbon in hydrocarbon gases such as coal gas, and afterwards mixing or combining therewith atmospheric air.

A.D. 1873, January 1.—No. 2.

ALLIBON, GEORGE, and MANBRÉ, ALÉXANDRE, of No. 19, Salisbury Street, Adelphi, London.—“An improved safety valve for steam boilers.”

Within a hollow casing or double chambered casting, the chambers of which are connected together by a passage or pipe, there is fitted in the lower portion or chamber a valve of suitable size, on the underside of which the steam pressure within the boiler acts, and which valve when raised from its seat by excess of pressure allows of the free escape of steam into a chamber and passage above the valve seat. Within the upper chamber is fitted a piston which may either be a solid mass of metal of a weight in accordance with the intended working pressure per square inch or it may be hollow and be charged with weights; or the piston may be only of sufficient depth to insure its working freely and steam tight, and the necessary dead weight by which the working pressure is regulated may be mounted upon the exposed or intermediate portion of the valve spindle or pressure pin by which the valve and the piston are connected together. The area of the valve in the lower chamber is greater than that of the piston in the upper chamber, to such an extent as may be most convenient, and the dead weight (applied as a constant load upon the valve) need only be sufficient to act against the pressure upon the limited area represented by the difference between the effective surfaces of the valve and the piston.

By the use of this “differential safety valve” the employment of the immense dead weights or loads ordinarily used upon the safety valves of high pressed steam boilers of sea-going steamers is entirely avoided, as is also the use of uncertain or unreliable spiral or other springs; and moreover the largest practicable area of safety valve and the freest escape or “blow off” may be provided for in high pressure marine steam boilers by the use of this apparatus.

This “differential safety valve” is equally applicable to other purposes than for marine engine boilers.

A.D. 1873, January 1.—No. 3.

BOWKER, WILLIAM, of the city of Manchester, in the county of Lancaster, engineer.—“Improvements in looms for weaving.”

This invention relates to the “dobby loom,” and consists in improved modes of working the healds according to the desired pattern of the fabric.

In one arrangement knives or lifters are placed in guides, so that they can move to and fro horizontally, and motion is given to them by means of one or more levers and rods from the tappet shaft of the loom.

For working the healds there is employed a number of three armed levers, one for each heald, two arms being connected by slotted links to quadrant jacks attached by cords to the upper staves of the healds, and the other arm having at each side a stud to which is linked a hooked wire, one for each knife, there being as many hooked wires for each knife as there are healds, and the hooks are continually being caught by the knives, and give motion to the three armed levers, jacks, and healds, unless prevented by pins or projections on pattern cylinders or lattices.

Another improvement relates to that description of the dobbie loom in which the knives move up and down vertically, and consists in improved modes of working the knives and pattern cylinders.

[No. 1.] Price 4d.

A

The knives are connected together by an endless band, and to one of the knives is jointed a rod connected to one arm of a long double lever, the other arm of which is connected by a rod to a crank on the tappet shaft of the loom, so that the knives can have to and fro motion without the inconvenience of having rods passing between the warps.

On the long lever there is a stud having a bowl placed in a slot in one arm of a lever, the other arm of which is linked to the shaft of one of the pattern cylinders, which shaft is connected by a rod to the other pattern cylinder, so that when motion is given to the long lever the two cylinders move to and fro simultaneously, and at the same time revolve by means of ratchet wheels on their shafts and catches on stationary studs, to enable the required pattern pins or projections to act on the hooked wires, or when motion is given to one pattern cylinder, the motion can be given to the other by two spur wheels, one on each shaft.

A.D. 1873, January 1.—No. 4.

POHL, OTTO ERNEST, of Liverpool, in the county of Lancaster, salt manufacturer and merchant.—“Improvements in apparatus employed in the manufacture of salt.”

This relates to evaporating apparatus in which the flames or heating gases are passed between two pans and consists in covering the top of the bottom pan with sheet iron or other material, preferably formed channel wise when viewed in transverse section.

The bottom pan is made wider than the top one, to allow rakes to be conveniently used.

A.D. 1873, January 1.—No. 5.

PAGET, FREDERICK ARTHUR, of 1, Seymour Chambers, York Buildings, Adelphi, in the county of Middlesex, civil and mechanical engineer.—(*A communication from Alexander Kalmar, Lieutenant in the Imperial Austrian Navy.*)—“Improvements in magnetic compass cards for iron and other ships.”

Replacing the ordinary compass card by a card drawn with two concentric compass cards. Forming between the two cards an annular zone or blank space. Connecting the magnetic courses of the inner card with the appropriate compass courses on the outer card. Similarly indicating the average heeling errors by lighter lines.

A.D. 1873, January 1.—No. 6.

STROUDLEY, WILLIAM, and DRUMMOND, DUGALD, both of Brighton, in the county of Sussex.—“Certain improvements in the method or process of casting metals.”

The novelty of the invention consists in exhausting the air and gases from moulds and matrices through the medium of an air pump or other exhauster as the molten metal is poured or run into the same, producing thereby sound, dense, and solid castings.

A.D. 1873, January 1.—No. 7.

PEEBLES, DAVID BRUCE, of the Fountainbridge Works, Edinburgh, in the county of Mid Lothian, North Britain, engineer.—“Improvements in apparatus for regulating and supplying illuminating gas.”

The improved regulating apparatus comprises a regulating chamber, within which all the working parts are contained, and into which the gas from the receiver or supply pipe is admitted through a valve aperture that is more or less closed by a conical or conoidal valve, the gas passing onwards from the regulating chamber by a pipe or pipes to the burners. The regulating chamber consists of rigid disc-shaped top and bottom, connected by a band of a suitable flexible material, such as leather or skin, so that if the internal pressure should exceed that of the atmosphere, together with the weight of the top and of any load that may be applied to it, the top can rise and the chamber expand. The inlet valve is fixed on a horizontal spindle which is screwed to work in an internally screwed bearing, and which is connected to the movable top of the chamber, so as when the latter rises, to turn the valve in the direction for closing it.

In supplying the gas in carriages or other locomotive structures each burner or set of burners is held by a spring to obviate the liability to the putting out of the light by a sudden jerk.

A.D. 1873, January 1.—No. 8.

VAN DEN BERG, JULIUS, of Portsmouth, merchant.—“Improvements in the mode of harnessing animals, and in apparatus therefor.”

Fixing to vehicles apparatus resembling a buckle with moveable tongue and catch. Making ends of traces to be used therewith on swivels.”

A.D. 1873, January 1.—No. 9.

GUMPEL, CHARLES GODFREY, of No. 49, Leicester Square, in the county of Middlesex.—“Improvements in apparatus for lowering and letting go ships’ boats.”

This invention relates to brake apparatus for easing the descent of ships’ boats, and latch hooks for suspending them from the davit tackles.

The fall ropes are passed round a grooved drum, against which another drum can be pressed by a brake block acted on by a lever, so that the ropes being gripped between the drums their motion can be retarded or stopped.

The latch hooks are of a forked form with the sling-rings of the boat resting on arms of bell-crank-levers mounted in the forks. As these arms carry the weight of the boat, the rings cannot be cleared by a pull of the bell cranks till the weight of the boat is eased by its becoming waterborne. By fastening the cord from the bell-cranks to the fore part of a vessel moving ahead, the drag of the boat when it is afloat serves to release the sling-rings automatically.

A.D. 1873, January 1.—No. 10.

GORDON, JOHN, of No. 3, Barnard’s Inn, in the county of Middlesex, gentleman.—“Improvements in the manufacture of envelopes.”

The novelty consists in making the back and front of envelopes the same, and so having a double flap or folds, which are fastened together by adhesive composition and folded down and fastened again on to the body of the envelope, thus securing greater safety and privacy than is obtained by the present method.

A.D. 1873, January 1.—No. 11.

PHILIPPI, FREDERIC, of Rue Richelieu, No. 19, Paris, jeweller.—“An improvement in smelling-bottles.”

This invention relates to the opening and closing of smelling bottles, and consists in the employment of two plates fitting truly one against the other. They are each formed with holes, and one of them is capable of turning on its axis, so as to bring the holes in the two plates opposite each other when it is desired to open the bottle, or to bring the full parts of one plate opposite the holes of the other plate when it is desired to close the bottle.

A.D. 1873, January 1.—No. 12.

DECASTRO, DANIEL, of Mortlake, in the county of Surrey.—“Improvements in gas meters.”

By this invention the pipe by which the height of the water in the meter is regulated has its ends, instead of passing through stuffing boxes, firmly fixed in the top and bottom of a chamber, which are constructed of lead or other flexible yet sufficiently rigid material. This flexibility allows the pipe to be exactly adjusted to the proper height.

The gas supply tube is fixed inside the same chamber instead of outside it, and the surplus water is led direct to the waste water chamber by a separate tube.

The inlet regulating valve is fixed under a bracket upon the inlet pipe or directly under the inlet pipe itself.

A.D. 1873, January 1.—No. 13.

HASELTINE, GEORGE, of the “International Patent Office,” Southampton Buildings, London, Doctor of Laws.—(*A communication from William Brainbridge McClure, John Charles Graham, and H. O. Claughton, all of Alexandria, Virginia, United States of America.*)—“An improved back chain for cart-saddles.”

This invention is a back chain for cart saddles which is provided with rollers for the purpose of easing its movement in the groove of the saddle and permitting it to readily adjust itself to the varying positions of the shafts as the wheels of the cart or dray pass over uneven ground, and consists mainly in the peculiar construction of the various links and the combinations with each other of the various parts.

A.D. 1873, January 1.—No. 14.

RAWLE, GEORGE, of 1, Temple Street, in the city of Bristol, and EVANS, WILLIAM NATHANIEL, of 1, East Street, Bedminster, near Bristol, in the county of Somerset.—“Improvements in the manufacture of leather.”

This Provisional Specification describes protecting the grain side of skins to protect them from the action of the tanning bath during the process of tanning.

A.D. 1873, January 1.—No. 15.

LEIGH, JOHN STUDDY, of No. 8, Old Jewry, in the city of London.—(*A communication from Charles Edward Wilson Bunster, of Valparaiso, Chili, South America.*)—"Improvements in apparatus and arrangements for transporting, removing, and carrying weights and persons from place to place."

This Provisional Specification describes an overhead single or endless rope railway supported at intervals; rope supported by sheaves or pulleys of a peculiar form, which allows the suspended load to pass free between them; steam or other motive power applied to operate the same; revolving drums for the endless rope to pass over; load allowed to pass from one section to another where the distance to be worked is too great from length; clip-jaws provided in some cases to attach load to rope; means to attach or detach loads without stopping endless rope; independent motive power may be applied to each section; buffers may be used when required.

A.D. 1873, January 1.—No. 16.

COOPER, JOHN, of Birmingham, in the county of Warwick, iron founder.—"Improvements in moulds and mould boxes for casting metals."

This invention consists in moulding pulley block wheels, hand wheels, and other small articles in the following manner.

A model having nearly the figure of one half of the wheel to be cast is fixed with its plain side downwards to the centre of a base plate. A half mould box being placed upon this board, a half mould is formed in sand, the exact position of the half mould box with respect to the model being determined by guides on the base plate. The base plate with the half mould being inverted, the said base board and the model are lifted therefrom and a second half mould is formed in a similar manner. The first made half mould has a space in it for receiving a temporary bottom; the two half moulds are thus moulded from the same model.

An annular core to form the groove in the edge of the wheel and the central core and "get" core having been laid in the first half mould, the two half moulds are put together and placed on a pedestal. The half mould boxes being of a slightly tapering figure, a gentle tapping detaches them from the mould, leaving the latter on the pedestal supported on the plate which formed the temporary bottom of the mould. The mould is removed from the pedestal and used for casting in the usual way.

Where small wheels are to be cast, the base board may carry several models, so as to make a mould in which several wheels may be cast at one time.

A.D. 1873, January 1.—No. 17.

BOUNDY, CHARLES, of Birmingham, in the county of Warwick, metal broker.—"Improvements in treating waste products and other materials containing zinc for the purpose of recovering zinc and other valuable products therefrom, and in apparatus to be employed for that purpose."

According to this invention the waste product or material, consisting principally either of hard spelter, old zinc, new zinc cuttings, or zinc riddlings from galvanizers' ashes, is placed upon the top of an incline, forming the bed of a muffle or nearly closed chamber, and heated so as to sweat from out of it the zinc, which zinc runs down the said inclined bed carrying with it any lead which may be contained in the material, and also solid particles of foreign matters. The liquid metal collects in the first of a set of receivers situated at the bottom of the bed. In the first receiver a large portion of the solid matter carried with the metals falls to the bottom. The metal in this receiver is removed from time to time, the upper part being poured back and the lower part being cast into ingots and treated again. As the first receiver becomes filled the zinc overflows into the next receiver, and so on, where a spontaneous separation of the kind described takes place. The separated and purified zinc finally collects in a large pan or reservoir, and may be cast into ingots or otherwise. Before treating zinc riddlings from galvanizers' ashes by the process described they undergo a preliminary treatment for the purpose of utilizing the sal-ammoniac and oxide of zinc contained in the said ashes.

A.D. 1873, January 1.—No. 18.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Oliver Pearl and Joseph P. Battles, both of Lawrence, in the state of Massachusetts, United States of America.*)—"Improvements in spinning machinery."

These improvements relate mainly to the construction and operation of the spindle and attached parts. They are especially intended for "ring spinning," but may be used in whole or in part in other kinds of

spinning frames. The main points of improvement are found in the step and its cover, the lubricating bolster with its double bearings and chamber, and in the form and construction of the interior of the bobbin.

A.D. 1873, January 1.—No. 19.

NEWTON, WILLIAM EDWARD, of the Office for Patents, 66, Chancery Lane, in the county of Middlesex, civil engineer.—(*A communication from Charles Franklin Wilson, of Northbridge, in the state of Massachusetts, and Sam Houston Miller and Jesse Edward Folk, both of Brooklyn, in the state of New York, United States of America.*)—"Improvements in dies for cutting and cupping or drawing metals and other materials."

This invention relates to the manufacture of various cupped articles by cutting or stamping out a blank from metal, pasteboard, or other material in the sheet and afterwards giving it a cup shape by indenting and drawing out such blank.

A.D. 1873, January 1.—No. 20.

NEWTON, ALFRED VINCENT, of the Office for Patents, 66, Chancery Lane, in the county of Middlesex, mechanical daughtsman.—(*A communication from Ellicott David Averell, of the city and state of New York, United States of America.*)—"Improvements in paper-ruling machines."

The invention consists mainly in the combination with an electro-magnet, armature, and striking pen beam actuated by the magnet, of a revolving cam composed of two or more sets of adjustable cam sections, a circuit breaker and closer attached to the pen beam for operation by the cam sections, and a stop gate for the purpose of causing the ruling pens to come into operation as required.

A.D. 1873, January 1.—No. 21.

WHITTENBURY, JAMES CALEB, and WHITTENBURY, JAMES CALEB, junior, both of Poplar, in the county of Middlesex.—"Improvements in convertible school desks."

The desk top is secured at each end to a bracket pivoted near the front to the upper front corner of the standard on which the desk is supported. At each extremity of said bracket is a lug, by which the desk top is secured in the desired position. The standards are made with an opening at the upper part, in which a shelf is supported beneath the desk top, the whole forming a cheap school desk which may be readily converted into a level table or backed seat as required.

A.D. 1873, January 2.—No. 22.

CRAVEN, THOMAS COWELL, of Hudson, in the county of Columbia and state of New York, in the United States of America.—"Improvements in means or apparatus for preparing cotton for manufacturing purposes."

The object of this invention is to control automatically the feed of cotton to the gin, and to regulate with precision the weight of bat produced, and consists—

First, in combining with the gin and its feed apron a revolving picking cylinder for the purpose of insuring a uniform supply of seed cotton to the gin, and, Second, in connecting the gin and lap arrangement with each other by a train of gearing in a machine in which the fibre is delivered from the gin directly to the scutcher or lap arrangement in such a manner that the length of lap produced may be adjusted in relation to the amount of cotton which is fed to the gin, so that a bat of any desired weight may be produced.

In carrying out the invention a series of circular saws or serrated surfaces are mounted on an axle, and between these saws or serrated surfaces a series of bars forming a grate or breast is arranged. A curved guard is attached to the end of the grate or breast. A seed board in conjunction with the grate or breast and the front of the case forms a hopper for the reception of the cotton whilst being acted upon by the saws or serrated surfaces. A series of brushes arranged on a cylinder operate in conjunction with the saws or serrated surfaces. An adjustable board regulates the amount of cotton delivered to the throat. A condenser or cage is arranged in position so that a current of air may be drawn through its surface by a fan or other exhaust. The exhaust chamber is provided with a door for the removal of refuse. The layer of fibre on the cage is condensed so as to give it sufficient density and tenacity by means of a roller. The receiving roller is mounted so as to be capable of rising as the lap is wound thereon, pressure being applied by springs or other means. An endless feed belt supported and driven by rollers receives the cotton from the feed box and conducts it to the feed cylinder, by which the cotton is delivered through a

chute into the hopper of the gin. The delivery of the cotton to the gin is regulated by a cylinder having a series of fingers arranged therein, supported on a shaft eccentric to its periphery, so that when the cylinder and the fingers revolve, such fingers shall protrude at the lower surface of the cylinder and be drawn within at the upper surface. The portion of the casing of the apparatus containing and supporting the grate or breast and the seed board is hinged or connected, so that it can be opened to give access to the parts within, and openings are formed in the sides of the case for a similar purpose. The condensing rollers and the cage may be caused to revolve together.

In carrying out the second part of the invention a shaft is mounted in bearings carried by the main frame, and the upper end of this shaft is provided with gearing in connection with the feed apparatus, and the lower end is geared in connection with the lap motion. A spur gear is keyed to and revolves with the shaft of the feed cylinder, and by means of an intermediate wheel is connected with the spur gear, communicating motion to the endless belt. By changing the size of the spur gear revolving with the shaft of the feed cylinder the motion of the endless belt may be increased or diminished, and consequently the amount of feed regulated as required. The eccentric finger cylinder may be driven by any suitable gearing in connection with one of the rollers supporting and driving the feed belt. A series of connecting gears may be arranged, so that the speed of the feed apparatus may be varied. In place of the endless apron a series of rollers may be employed.

The gin is by preference driven independently.

A.D. 1873, January 2.—No. 23.

SMITH, AUSTIN HENRY, of Brooklyn, in the state of New York, United States of America.—“Improvements in machinery for crushing stone and other substances.”

A hopper for the stone or material to be crushed is made with a movable jaw at one side; the hopper is wider at the mouth than at the upper end, to allow the material to spread as crushed.

The jaw swings from adjustable bearings and is connected with a hydraulic ram in a strong cylinder or vessel containing liquid. A plunger is forced into the liquid and moves the ram and jaw; as it rises, a spring draws back the jaw and keeps the ram against the water or liquid. A stop determines the movement.

A safety valve prevents injury, and an inlet valve allows the plunger to draw in liquid to supply any deficiency in the cylinder.

A.D. 1873, January 2.—No. 24.

OLDKNOW, JAMES, of Villa Road, in the town and county of the town of Nottingham.—“Improvements in the manufacture of fabrics in twist lace machinery.”

The invention consists in the application of embroidery threads in ornamental designs upon the surface of fabric known as “tape” or “muslin” bands.

The embroidery threads are attached to the surface of the fabric by operating those threads to the desired figure or pattern by the jacquard, so as to bring them into position to be caught and retained by the bobbin threads in their traverse, such bobbin threads also constituting the weft of the tape or muslin and the means of attachment of the embroidery threads to the surface of that tape or muslin.

A.D. 1873, January 2.—No. 25.

PARLOUR, JOSEPH THOMAS, of Rutland Street, Pimlico, in the county of Middlesex, civil engineer.—“Improvements in cabs and other vehicles.”

One part of my said invention consists in constructing a cab or other similar vehicle with a door or pair of doors under the driver's seat which is placed at the upper part of the back of the vehicle. Another part of the said invention consists in arranging a seat or seats just inside the said door or doors and making the same adjustable, so that they may be moved out of the way to leave a clear passage into and out of the cab, and let down upon suitable supports when the doors are closed. Another part of the said invention consists in mechanism whereby the opening and closing of the doors, and the adjustment of the seats may be effected by the driver in his seat. Another part consists in constructing the body of a cab or other vehicle of sheet iron or other thin metal, and another part consists in making the shafts or poles of cabs or other vehicles of metal tubing or hollow metal bars or rods.

A.D. 1873, January 2.—No. 26.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(A communication from Richard Eaton and John H. Hall, both of Montreal, Canada, gentlemen.)—“Improvements in machinery for manufacturing meal or flour.”

This invention relates to a novel apparatus or machinery for reducing grain to flour, and also for reducing oats, peas, and the like to meal; the advantages obtained by its use are great saving in first cost over the usual burr stones, cheapness and increased efficiency in working, as it does not require dressing, and capability of producing an article equally as good as, or superior to, that at present manufactured. It is also easily adjustable to produce either fine or coarse flour, as may be desired, and the flour issuing from it is perfectly cool, instead of, as at present, leaving the mill in a highly heated state.

A.D. 1873, January 2.—No. 27.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from James H. Small, of Buffalo, New York, United States of America.*)—"An improved brushing machine for cleaning horses."

This invention relates to a machine for cleaning horses, and is designed as a substitute for the usual hand apparatus; it has a rotary brush driven by a suitable prime mover and capable of free adjustment and application to the different parts of the animal whereby the most thorough cleaning of a horse is effected in a few minutes.

A.D. 1873, January 2.—No. 28.

NEWTON, WILLIAM EDWARD, of the Office for Patents, 66, Chancery Lane, in the county of Middlesex, civil engineer.—(*A communication from Auguste Désiré Bernard Wolff, of Paris, in the Republic of France.*)—"An improved transposing key-board or manual, applicable to pianofortes, organs, harmoniums, and other analogous instruments."

The object of this invention is to convert any ordinary piano-forte, organ, or other analogous instrument into a transposing instrument by placing an additional and adjustable key board above the ordinary key board or manual.

A.D. 1873, January 2.—No. 29.

MORRIS, EDWARD RUSSELL, of Birmingham, in the county of Warwick, and of Hampstead, in the county of Middlesex, engineer.—"An improved instrument for measuring distances on maps, drawings, and for other measuring purposes."

The instrument consists of a circular box enclosing a pulley to which a pointer is secured, and which receives motion from a travelling roller having a roughened boss by a band. The sizes of the pulleys and boss are of such proportions that the pulley receives one revolution and gives one revolution to the hand to ten inches travel of the roller.

The casing is provided with a movable glass front secured by catches, and underneath which are placed scales or dials, upon which the distance is recorded by the hand.

When using the instrument the roller and hand are set to zero on the scale, with the centre of the roller immediately over one end of the line, roadway, river, or other object on the map, drawing, or surface to be measured. The roller is then run along the line, following all the bends as much as possible, and when it has arrived at the other extremity the exact distance traced is immediately ascertained by glancing at the position of the hand or pointer on the dial.

A.D. 1873, January 2.—No. 30.

LEATHAM, WILLIAM, of Brookfield Engine Works, Leeds, in the county of York.—"Improvements in the construction and arrangement of safety and other valves and apparatus in connection therewith."

The Provisional Specification of this invention describes:—Firstly, an improved construction of disc valve and seating and means for covering the adjustments. The seat of the valve is formed with an annular or ring space and a series of openings, and within the annular or ring space is formed a cup with a bridge across to receive the stem of the valve, and also a spindle on which is an eccentric or tappet to operate upon the foot of the valve stem when necessary. On the valve are projecting facings forming covers for the openings in the seat leaving recesses betwixt, and on each facing is a wing projecting into the openings.

In or upon the stem or other part of the valve or valves is one or more screws or inclined planes fitting into and capable of working in one or more fixings. In connection therewith is a spindle having a centre point or otherwise for the valve or valves to act upon.

On this spindle is fixed a plate or seat to support one or more springs, and also on the said spindle (at the opposite end of the spring or springs) is another plate capable of sliding on the spindle. By means of a screw or other mechanical equivalent the spring or springs may be expanded or contracted. A lid is

attached or hinged to the apparatus to cover this screw or its equivalent which can be locked when the spring or springs are adjusted to prevent them being tampered with.

Secondly, the invention consists in the application to the said or an ordinary safety valve of an auxiliary valve. The arrangements of this valve being such that when the valve or valves lift to allow an escape of steam a lever transmits the power of the auxiliary valve to assist the escape valve in opening.

Thirdly, in connection with the lever connecting the auxiliary and other valve or valves of a rod which extends through the shell of the boiler and is jointed to a lever hinged within the boiler. Floats are attached to this lever so as to operate the valves automatically when the water is too high or too low in the boiler.

Fourthly, in the application to regulating valves of a screw or inclined planes as set forth in the first part of this Specification connected by a socket joint so that the valve will move direct or not turn upon its axis when moving to and from its seat.

Fifthly, in constructing one of the discs or valves used in connection with an equilibrium valve or valves with a cylindrical flange to fit and work outside of a cylindrical fixing, such valve being provided with a stuffing box or packing ring to prevent escape of steam or other fluid used. Also in the application to such valves of an adjustable spring or springs to act thereon for lifting or opening the said valves,

A.D. 1873, January 2.—No. 31.

NEEDHAM, JOSEPH, of Piccadilly, in the county of Middlesex, gun maker.—“Improvements in repeating fire-arms and in cartridges to be employed therewith.”

This invention consists of a simple construction of repeating fire arms wherein the same lever which is employed to open the breech also acts as a trigger for discharging the gun. The breech piece is provided with a sliding plug which expels the spent cartridge case by the act of opening the breech to receive a fresh charge.

A.D. 1873, January 2.—No. 32.

HARRISON, BENJAMIN, of Kingsland, in the county of Middlesex, engineer, and CONDER, EDWARD, of Kingsland aforesaid, builder.—“Improvements in obtaining motive power, and in the apparatus employed therein.”

This invention consists in the employment of a combination of spiral or helical springs for imparting motion to machinery or to carriages.

A.D. 1873, January 2.—No. 33.

HENRY, MICHAEL, of Fleet Chambers, 68, Fleet Street, in the city of London, patent agent.—(A communication from Gustave Joseph Dupuch, of 17, Boulevard Saint Martin, Paris, France.)—“An improved water gauge.”

The gauge consists of two cocks united by a glass tube held in a protective casing with openings. There is a valve in each cock, which valves if the tube should break are caused to close the passage for steam and water, by the action of the steam and the water themselves.

A.D. 1873, January 2.—No. 34.

BOES, JOSEPH, of 38, Swinbrooke Road, Notting Hill, in the county of Middlesex.—“A new improved oven for baking bread and confectionary.”

1. The oven discharges no smoke.
2. It can be constructed of various materials.
3. It can be constructed in any form or size.
4. The bread or confectionary can be put in or withdrawn from the oven uninterruptedly on several sides.
5. Considerable saving of time and labour.
6. Great saving of fuel.
7. Consumption of its own smoke.
8. The heat is regulated as required.

A.D. 1873, January 3.—No. 35.

STEPHENS, WILLIAM BRITTON, of 67, Strand, in the city of Westminster, gentleman.—“Improvements in the manufacture of paints.”

The application and use of slacked lime or plaster of paris, one or the other, or both, instead of or in combination with the usual bases employed in the manufacture of paint.

A.D. 1873, January 3.—No. 36.

LOWE, ORLANDO, of Stretford, in the ancient parish of Manchester, in the county of Lancaster, surgical plaster manufacturers' manager.—“Improvements in steam boilers.”

My invention consists in substituting for a fire brick arch, usually constructed at the end of the fire bars of steam boilers, an iron cylinder or tube formed of ordinary boiler plates, and rivetted at each side to the boiler by a flange. The cylinder or tube is open at each end, so as to allow the water in the boiler to flow freely through such iron cylinder or tube, thereby presenting a larger surface to the action of the fire, and thereby also causing the more rapid generation of steam in the boiler than is possible by the mode at present in use of constructing steam boilers. Stays can be used to strengthen the cylinder or tube.

A.D. 1873, January 3.—No. 37.

GARDINER, PERRY GREEN, of New York, in the county and state of New York, in the United States of America.—“Improvements in railroad car-springs.”

My improvements relate to elliptic steel springs. My invention consists, first, in hinging the bars of which the elliptical portion of the spring is composed alternately upon the locking or front pin, second, in constructing the elliptical bars which constitute the two sides of the spring with such a ratio to each other that there will be an even number of bars on one side and an uneven number on the other, third, in the construction of a central holding clip or clamp in two parts to admit the bars within it, fourth, in connecting the elliptical bars at the ends to the bolt or pin by eyes formed by bending the ends of the bars, fifth, in combining with the elliptical square or round bar spring thus constructed a vertical spiral and auxilliary spring and sectional bolt.

A.D. 1873, January 3.—No. 38.

BISCHOF, GUSTAV, of the Andersonian University, in the city of Glasgow, Professor of Technical Chemistry.—“Improvements in the purification of water, and in the means and apparatus employed for that purpose.”

This invention has reference to the process of purifying water by filtering it through spongy iron, for which Letters Patent No. 2516 of 1870 were granted to the petitioner.

The present invention consists in causing the water to filter through marble or limestone after passing through the spongy iron in order to remove the iron taken up by the water. Filters for this purpose are described consisting of a vessel with perforated bottom containing the spongy iron placed above a vessel with perforated bottom containing the marble or limestone, and arrangements are described whereby the water after filtering through the spongy iron is made to rise to the level of the spongy iron again before flowing down on to the marble or limestone, in order to keep the spongy iron always immersed. Animal charcoal may also be employed in place of the marble or limestone for retaining the iron.

A.D. 1873, January 3.—No. 39.

WHITING, GEORGE FITZGERALD, of Grove Villas, Balham, in the county of Surrey, and BOLTON, JAMES CHARLES, of St. Mary Axe, in the city of London.—“Improvements in window-fasteners.”

The apparatus which forms the subject of this invention consists of two principal parts. One is a metallic plate capable of being attached to the upper sash of the window, and to which is connected a horizontal lever free to turn upon a vertical pivot. The other portion of the apparatus is attached to the lower sash, which is recessed for its reception, and partly consists of a horizontal metallic plate provided with a longitudinal slot therein for the reception of a flat metallic bar attached to a pivot on which it is free to turn at one end thereof, and having the other end of an angular form. The angular end of the bar is elevated when in its normal position by means of a suitable spring placed beneath the same, or by a weight at the other end thereof, the upper surface of the bar being thus caused to assume an oblique position. A hooked piece of metal is also attached to the horizontal plate at a sufficient distance from the angular end of the bar to admit of the lever being placed between the same respectively. In order to fasten the sashes

[No. 1.]

B

the lever is moved forwards on its pivot, thereby depressing the bar on the lower sash until the former has passed the angular end of the latter, when it is stopped by the hooked piece of metal attached to the horizontal plate, and the angular end of the bar rising by the agency of the weight or spring, the lever is held firmly in position. To enable the lever to be moved backwards to liberate the same, a pin or stud furnished with a suitable head is attached to the front side of the bar at or near the angular end thereof, and which works through a slot in the front edge of the lower sash. Upon the pin or stud being depressed the bar is placed in a horizontal position, and the lever can be readily moved backwards to allow of the window being opened.

A.D. 1873, January 3.—No. 40.

HUNT, BRISTOW, of Serle Street, Lincoln's Inn, in the county of Middlesex, gentleman.—(*A communication from George Lee Anders and Ebenezer Baker Welch, of Cambridge, Middlesex county, Massachusetts, in the United States of America.*)—"Improvements in printing telegraph instruments."

The improvements consist mainly in a series of mechanical devices arranged and operating in combination with an electro-magnet and a polarized magnet under certain electrical conditions that each of the magnets shall release an escapement, the polarized magnet releasing the type wheel escapement and the electro-magnet that of the press mechanism; and further in the manner of actuating these escapements separately by two trains of wheels impelled by one main spring.

A.D. 1873, January 3.—No. 41.

MCCLEAN, FRANK, of No. 21, Whitehall Place, in the city of Westminster, civil engineer.—"Improvements in apparatus for raising ships and vessels out of the water for examination and repair."

This Provisional Specification describes sinking a pontoon in a lock chamber then floating a vessel into the lock and running out the water until the pontoon has sufficient power of flotation. The water is then again admitted and the vessel floated out on the pontoon.

A.D. 1873, January 3.—No. 42.

THOMPSON, WILLIAM GORDON, of Manchester, in the county of Lancaster, manufacturing chemist.—"An improved process and apparatus for extracting oleaginous or fatty matters from liquid or solid substances."

The object of this invention is to separate oleaginous and fatty matters from various substances with which they may be combined so that such oily or fatty matters when separated may be applied for various purposes in the arts.

A.D. 1873, January 3.—No. 43.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Henry Picq, of Paris, in the Republic of France, architect.*)—"Improvements in the transmission of power, and in the machinery or apparatus employed therein."

The essential features of this invention consists in transmitting power by means of fluids which constantly circulate in pipes and transmit the motion of a distributor actuated from the source of motive power to receivers situate at any required distances and which impart their motion to the machines to be driven the surplus power when the working of any one or more of the receivers is stopped being conducted to a compensator.

A.D. 1873, January 4.—No. 44.

BUCKLEY, SAMUEL, of No. 8, Tower Street, Hyde, in the county of Chester, tool maker.—"Improvements in the construction of a combined pipe wrench and cutter."

The features of novelty which constitute this invention are the construction of a teethed jaw forming the segment of a circle projecting from the enlarged end of the barrel and the application of a claw or claws enabling it to answer as a one wheel cutter and wrench with one claw and as a three wheel cutter with the other claw.

A.D. 1873, January 4.—No. 45.

CROLL, ALEXANDER ANGUS, of Coleman Street, in the city of London, civil engineer.—“Improvements in means or apparatus for the distillation of ammoniacal liquors, which improvements are also applicable in the distillation of other liquids, and in the concentration of soluble salts.”

The invention relates to means by which the liquid matter to be acted upon is received into the upper of a series of evaporating trays or chambers, and in overflowing that passes to the next, and thence to each in succession until it arrives at the lowest, which is that immediately over and surrounding the fire. The heat from the fire passes up through the centre of the lower chamber, thence radially over the liquor in that chamber and under the chamber next above, and thence under and over each to the outlet.

The fire-door of the furnace is sealed after the supply of each charge to cause all the atmospheric air to pass through the fire, and such air is forced upwards or forwards where the vapour has to pass through another media, as in the manufacture of sulphate of ammonia, or it may be drawn by vacuum.

A.D. 1873, January 4.—No. 46.

LEEMING, THOMAS, and **RAY, RICHARD**, both of Manchester, in the county of Lancaster, lithographers, and **LYNDE, FRANCIS GASCOIGNE**, of Kirkby Stephen, in the county of Westmoreland, civil engineer.—“Improvements in machinery for bronzing, coloring, or otherwise ornamenting paper, and other materials.”

The paper or other material to be bronzed or otherwise ornamented, having its printed side upwards, is fed into a box and passes between the bronzing brush and an india rubber or other suitable endless belt passing over rollers and between brushing and polishing rollers. The bronze or other powder is contained in a stationary or revolving box with perforations. The slits in the box through which the paper or other material is fed and discharged, are provided with india rubber and other flap valves.

A.D. 1873, January 4.—No. 47.

BURTON, PETER, of Kennington, in the county of Middlesex.—“Improved means and apparatus for opening, closing, and securing the doorways of railway trains.”

This consists in opening and closing the doorways of railway trains by the use of sliding panels or sliding doors, which are all throughout the train opened or closed by the guard, driver, or other attendant, and secured by one or the other of them.

A.D. 1873, January 4.—No. 48.

WHITBURN, THOMAS, of Guildford, in the county of Surrey, artist.—“A new or improved method or process to be employed in printing and reproducing on wood and on veneers of wood, and on papier-mâché, designs, patterns, and devices for ornamental and decorative purposes.”

The novelty of this invention consists in printing & reproducing designs, patterns, & devices on prepared wood, wood veneers, & on papier-mâché for ornamental & decorative purposes. A press being employed to produce the requisite impression on the wood or other surface.

A.D. 1873, January 4.—No. 49.

AITKEN, THOMAS, of Manchester, in the county of Lancaster.—“Improvements in printing calico and other textile fabrics.”

This invention applies to that class of printing on calicoes and other woven fabrics wherein it is desirable to print a stripe or other pattern across or upon the pieces at intervals, the spaces between such stripes or patterns being wider than the circumference of the ordinary printing rollers. Hitherto such printing has been invariably effected by means of blocks worked by hand, but by the application of this invention it can be effected much more expeditiously and economically by means of the ordinary calico-printing machine.

The invention consists principally in so mounting the roller whereon this particular part of the pattern is engraved that it can be raised up out of contact with the calico or other woven fabric being printed and be lowered or brought into contact therewith at the required intervals.

A.D. 1873, January 4.—No. 50.

SPENCE, PETER, of Newton Heath, Manchester, in the county of Lancaster, manufacturing chemist.—“Improvements in obtaining valuable substances derivable from residual liquors produced in the manufacture of alum from natural phosphates of alumina.”

This invention refers to obtaining valuable substances from the liquor arising from the manufacture of alum by the process patented by the present inventor dated June 9th, 1870, No. 1676.

A.D. 1873, January 4.—No. 51.

WELCH, EDWARD JOHN COWLING, of Liverpool, in the county of Lancaster, engineer.—“An improved locked safety valve arrangement for marine and other purposes.”

This invention consists in the general arrangement of mechanism for the purpose of protecting the spring used in connection with safety valves from the action of the steam by the use of a flexible diaphragm and without using any stuffing box; and also in the arrangement of a valve without any guides or sliding parts exposed to the action of the steam or water, all the necessary means for guiding the valve being protected by the said diaphragm. The whole arrangement is fastened by a padlock in such a manner that it cannot be tampered with.

A.D. 1873, January 4.—No. 52.

LYTTLE, WILLIAM ALEXANDER, of the Grove, Hammersmith, in the county of Middlesex, engineer.—“Improvements in roofs, partly applicable also to floors and pavements.”

The features of novelty are—

1st. The construction of flat roofs so arranged that they can at pleasure be converted into shallow water tanks with the water at a maximum level which cannot be exceeded.

2nd. The employment of a thin layer of very plastic asphalt between two layers of plaster or cement to serve like the clay “puddle” of canal banks in keeping the aforesaid roofs watertight.

3rd. The employment of a cement or concrete containing a small percentage of blood as a foundation for asphalt, wood, or stone in the formation of roofs, floors, or pavements.

A.D. 1873, January 4.—No. 53.

KESTERTON, HENRY, of Park Road, Mosely, near Birmingham.—“Improvements in the manufacture of rolled tubes, bars, and plates.”

According to this Provisional Specification, tubes are rolled from a coil of puddle bar. Tubes, bars, and plates are rolled at once to the finished form required by a series of rolls, one in front of the other, and which are independently driven, and the tube, bar, or plate controls the speed.

A.D. 1873, January 4.—No. 54.

KESTERTON, HENRY, of Park Road, Mosely, near Birmingham.—“Improvements in the construction of metal telegraph posts.”

According to this Provisional Specification, a taper tube is rolled and cut into lengths, the ends are expanded into rings having lugs upon them, and π form clips or rivets are used to fix the parts together when the post is erected.

A.D. 1873, December 4.—No. 55.

JEWITT, HENRY, of Kentish Town, in the county of Middlesex.—(*A communication from William W. Rose, of New York, United States of America.*)—“A new or improved toy.”

The toy which forms the subject of the present invention consists of a series of blocks of wood or other material; each block having upon its upper surface a portion of a picture or representation and on the reverse or under side an alphabetical letter, the alphabet serving as a key to the proper disposition of the blocks.

A.D. 1873, January 4.—No. 56.

UMBERS, EDWARD, of Weston Hall, near Leamington Spa, in the county of Warwick, farmer, FENN, ARTHUR GEORGE, of Beccles, in the county of Suffolk, engineer, and WHITEMAN, WILLIAM THOMAS, of No. 35 Maitland Park Road, in the county of Middlesex, gentleman.—“Improvements in and apparatus for signalling on railways.”

The object of this invention is to signal from one train to another on the same line of rails in such a manner that the leading train shall intimate its position to the engine driver and guard of the next succeeding train at a distance of three quarters of a mile or other suitable distance by means of red and green lights or discs exhibited to such driver and guard from lamps carried on the engine and in the break van of such succeeding train.

The first portion of this apparatus consists of “setting apparatus” mounted on the permanent way or on the sleepers, which apparatus being acted upon by apparatus carried by passing trains works (by means of connecting chains) “delivering apparatus,” which is also mounted on the sleepers or on the permanent way. This latter apparatus acts on mechanism carried by the next succeeding train and thereby exhibits the red or green glasses or discs to the driver and guard of such train.

APPENDIX
TO
CHRONOLOGICAL AND DESCRIPTIVE INDEX,
CONTAINING THE

Abridgments open to public inspection before the expiration of the term of six months (in consequence of the Patentees having filed their Final Specifications), and also the Abridgments of Complete Specifications received from June 28 to July 4, 1873. These Abridgments will be subsequently printed in the body of the book, in order to preserve the numerical and chronological arrangement.

A.D. 1873, January 6.—No. 59.

FOULIS, WILLIAM, of Glasgow, in the county of Lanark, North Britain, civil engineer.—“Improvements in charging and drawing retorts, and in the machinery or apparatus employed therefor.”

The feature of novelty which constitutes this invention is the employment of hydraulic cylinders for operating “scoops” or “rakes” for charging or drawing the retorts. The cylinders may be connected by telescopic joints, and may be operated with air, steam, or other fluid or liquid in lieu of with water pressure.

A.D. 1873, January 6.—No. 64.

WILLIAMS, AARON WHITE COOK, of Paris, France, now of No. 8, Southampton Buildings, London, merchant and manufacturer.—(*A communication from George I. Capewell, of Cheshire, Connecticut, United States of America.*)—“An improved apparatus for extracting nails.”

My invention relates to a simple, cheap, and efficient implement for extracting nails. The said implement has a hollow cylindrical stem. Firmly secured to the lower end of the said stem is a steel plug. The outer part of this plug forms a sharp pointed claw, affixed to this claw by a rivet is a second claw. From this second claw extends a curved arm which forms a fulcrum. Into the cylindrical stem I fit a rammer which may be moved freely within the stem, but is kept in position therein by a strap.

A.D. 1873, January 7.—No. 68.

ARGALL, JOHN, of Adderbury, in the county of Oxford, mining engineer.—“Improvements in the manufacture of oil paints.”

This invention consists in giving body or opacity to the paint by using as a basis the natural mineral carbonate of baryta and zinc, or native zinc ore, to which carbonate of baryta is afterwards added. The zinc ore or the baryta and zinc mineral is subjected to a roasting process. The required colour or shade of colour is given to the paint by the addition of calcined ores of lead, tin, zinc, copper, iron, or manganese, to the compound or mixture.

By the use of baryta a peculiar glossy surface is given to the paint, and the said baryta also effects such rapid drying of the paint that the use of ordinary dryers is rendered unnecessary.

A.D. 1873, January 7.—No. 73.

LAMB, JOHN WILLIAM, manufacturer, and LOWE, SAMUEL, machinist, both of Nottingham, in the county of Nottingham.—“Improvements in apparatus for transferring knitted fabrics to circular knitting machinery.”

This invention relates to means for facilitating the junction of ribbed work with plain work in the circular knitting frame, and it consists in the use of automatic apparatus for laying the ribbed work onto the needles of the circular knitting frame.

A.D. 1873, January 8.—No. 84.

SCHOEVERS, ALEXANDER TIMON CORNELIS, of the Hague, in the Kingdom of Holland, surgeon.—“Improvements in trusses for the cure and relief of hernia.”

[No. 1.—APP.]

(A)

This invention refers wholly or mainly to the pad or cushion of trusses, and consists in making the said pad or cushion as follows:—

The back of the pad is made of a series of radial spring arms connected to a central plate, the springs and plate having a dome like figure, the outline of the dome being either circular or elliptical. Within the dome or spring back is a conical coiled spring. The parts described are contained within a case or cover of vulcanized india rubber. The pad is so connected to the spring band passed round the body of the person using the truss as to allow the pad considerable range of motion about the end of the spring band. The face of the pad is slightly convex, the central part projecting considerably by the action of the conical spring.

In using the truss the central part of the face of the pad is applied to the centre of the rupture, the said pad being pressed by the spring band against the body. The edge of the pad is thereby pressed all round against the body, and the position of the pad fixed by the hold which its edge acquires on the flesh of the part to which it is applied.

By these improvements the pressure of the truss is applied to the rupture at the precise point required, and the truss is not liable to displacement by the motion of the body of the wearer.

A.D. 1873, January 9.—No. 95.

GAY, PAULIN, of Rue de Grammont, No. 11, at Paris, civil engineer.—“Improvements in machinery for cutting or excavating coal, stone, or other minerals.”

This invention consists in improved modes of giving the cutting tools a revolving and advancing motion at the same time, for the purpose of making slots or mortices at the sides or other parts of the seam or gallery of the mine or rock, and also in improved arrangements and contrivances for enabling the machinery to be comparatively light in weight, easily moved from place to place, quickly fastened, and its parts changed as required with ease and expedition.

A.D. 1873, January 13.—No. 134.

TRIPPE, FREDERICK JOHN, of Southampton, in the county of Southampton, woollen draper.—“An improved machine for cutting textile fabrics into small portions for patterns, samples, and other purposes.”

This machine consists of a horizontal table supported upon a stand, two rollers being placed beneath the former, and on which an endless band is arranged so as to work either forwards or backwards over the table. In connection with the table is a screw press in the foot of which is a slot, immediately beneath which is a similar slot in the bed or table of the machine. The fabric is laid upon the endless band and carried by it up to a regulating guage, and held by the pressure of the screw press. A suitable knife, having, by preference, a handle similar to that of a saw, is arranged to work by hand vertically through the slots, so as to cut the fabric as may be desired.

A.D. 1873, January 27.—No. 309.

IMRAY, JOHN, of No. 20, Southampton Buildings, Chancery Lane, in the county of Middlesex.—(*A communication from Gustave Quimbel, of Elbeuf, France, boiler-maker.*)—“Improvements in steam boilers.”

This invention relates to a construction and arrangement of steam boilers and their flues and heating surfaces, so as to utilize to the greatest extent the heat of the fire.

The body of the boiler is made of crescent shape, the hollow of the crescent forming a fire place and flue. In this flue and in flues in the setting on each side of the boiler are placed cylindrical generators communicating by large ducts with the boiler. Below the boiler the flue is carried downwards and to and fro in a zig-zag direction, and in each of these zig-zag channels is placed a tube communicating at opposite ends with the tubes above and below it. The feed water is supplied to the lowest and coolest of these tubes, and is heated as it passes upwards to a tube placed in the ashpit, which communicates with the boiler by its side generators. The products of combustion after leaving the last of the zig-zag flue channels are carried through zig-zag pipes of thin metal placed in a chamber through which air passes to the boiler fire, the air being thus heated and the products of combustion cooled before they escape to the chimney.

For starting the boiler a valve or damper is opened, permitting the products of combustion to pass directly from the side flues of the boiler to the chimney until the draught be established.

A.D. 1873, January 27.—No. 320.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from George Broomhead, of Paterson, in the county of Passaic and state of New Jersey, United States of America.*)—"A new or improved machine for scouring and polishing wire."

This invention consists of a machine by which the wire is scoured and polished by motive power at a greatly reduced expense than hitherto.

A shaft mounted at one [end*] of a frame carries a spool-drum, on which the wire to be polished is placed, the wire being thence led through the polishing material, which is contained in boxes or projections on a bar to which reciprocating motion is given, the wire being subsequently wound on a drum at the opposite end of the machine.

A.D. 1873, January 28.—No. 325.

IMRAY, JOHN, of No. 20, Southampton Buildings, Chancery Lane, in the county of Middlesex.—"Improvements in the means of subjecting substances to heat for effecting continuously drying, roasting, calcining, evaporating, distilling, gas-producing, and other like operations, and apparatus therefor."

This invention relates to means of applying heat to substances so as to effect continuously operations such as drying, roasting, calcining, evaporating, distilling, gas producing and the like.

A heated liquid such as molten metal is caused to circulate either regularly or intermittently by pulses in a canal, or in channels communicating with each other, so that the liquid makes a complete circuit.

The matter to be operated on is dropped or fed upon the circulating liquid and carried along by it, subjected to the heat during its progress, the matter or residuary matter being removed at another part of the circuit.

For drying and like operations when the gases or vapours evolved are not to be collected, the canal may be open. But for distilling, gas producing and the like, the canal is closed over like a pipe, or covered by a hood of inverted U shape, the limbs of the hood dipping into the circulating liquid so as to seal the interior from the outer air.

A.D. 1873, February 12.—No. 525.

SHOLL, CHARLES, of Manchester, in the county of Lancaster.—"Improvements in atmospheric hammers and in apparatus connected therewith."

I employ lignum-vitæ as a lining for the cylinder, I also make the piston of similar material. I provide the stuffing box with pneumatic leathers. The piston discs are provided with leathers. I arrange a friction-brake and a tightening pulley in combination with the hammer. I use with the said hammer a disc for heading bolts. I provide the cylinder with a number of taps to regulate the length of stroke and force of the blow. I connect the piston in the hollow hammer tupp directly to the crank. I suspend the hammers from girders or other suitable supports on the ceiling or wall so that the anvil block will be independant of the said hammer.

A.D. 1873, March 24.—No. 1084.

COCKER, JAMES, of Tonge, near Middleton, in the county of Lancaster, manager.—"Certain improvements in self acting mules for spinning and doubling."

My invention relates to the winding on motion, and consists in certain improved arrangements of parts for governing the winding of the yarn on the spindles in proportion to the increasing diameter of the cops. The screw of the radial arm gives motion to a cam acting on a lever in the carriage, which lever is connected by chains and pulleys to the faller shaft.

A.D. 1873, May 15.—No. 1770.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from William Sprague, of South Kingstown, Rhode Island, United States of America.*)—"Improvements in mechanism for facilitating the movement of traction engines."

This invention consists in combining with the rims of wheels of traction engines, sectional tracks, which as the wheels revolve are laid tangential to the rim in front of the wheel to form a track to prevent the wheels sinking into the ground. The several sections of the track, after the wheel has passed over them, are taken up by the wheel and carried over by it to be laid in front of the wheel again.

* The word "end" is found in the copy of the Abridgment delivered by the Applicant, but does not appear in the original Abridgment.

A.D. 1873, June 25.—No. 2212.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws.—(*A communication from Eliza H. Alexander, of the city and state of New York, United States of America.*)—"Improvements in braiding attachments for sewing machines."

The said invention consists chiefly in the use of a tube surrounding the braid or through which it passes towards the needles and in so combining the said tube with the presser foot or other guide connected with the machine that the braid may be easily turned over upon itself when an angle or reversed direction is to be given to it.

A.D. 1873, June 28.—No. 2255.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws.—(*A communication from John Tesseyman and Edmund Irving Howard, both of Dayton, Ohio, United States of America, gentlemen.*)—"Improvements in valve-gear for direct acting steam engines."

The purpose of this invention is to increase the efficiency, economy, and durability of direct acting engines. It consists principally in the employment of a reciprocating head with grooves which impart motion to the valve, also in the construction of an adjustable spring attachment for leading the wrist pin of the rocker shaft from one groove to the other in the reciprocating head. It consists finally in the device as a whole.

A.D. 1873, June 28.—No. 2257.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws.—(*A communication from Clifton David Hunter, of Marlborough, Massachusetts, United States of America.*)—"Improvements in inhaling apparatus."

The first part of this invention consists in the application of a valve to the exhaust tube or inlet tube. The second part consists in placing the acid vessel within a cavity or recess within the stopper of the main receptacle. The third part consists in providing the stopper of the main receptacle with a groove for the inlet tube. The fourth part consists in a band so fitted that it may be stretched over the stopper of the acid vessel. The fifth part consists in the application of a valve to the inlet tube.

A.D. 1873, June 30.—No. 2261.

EVANS, WARREN RICHARD, of Lynn, county of Essex, commonwealth of Massachusetts, one of the United States of America.—"Certain improvements in repeating fire arms."

This invention relates to repeating fire arms, and consists, first, of a novel arrangement of a magazine to contain cartridges; and, second, of a block to operate the magazine, load and discharge the fire arm, and remove the cases of the exploded cartridges.

The magazine consists of a hollow tube passing down through the stock of the fire arm, and provided with an aperture for the introduction of cartridges. Attached to the inside of the tube is a spiral rib, within which is arranged a fluted shaft, in the flutings of which the cartridges lie, so that when the shaft is made to revolve they are propelled forward by the spiral rib.

The lock of the fire arm consists of a hammer turning upon a centre and actuated by a spring. This hammer works in a slot formed in a breech block, which also turns upon a centre working through an inclined slot, and is actuated by a suitable lever or handle. When the handle is thrown down, the breech block cocks the hammer, which is retained in a cocked position by a trigger in the usual way.

The depression of the handle of the breech block at the same time actuates a separate bent lever which turns upon a centre, and when so moved opens an aperture through which the case of the cartridge last exploded falls, having been withdrawn from the breech of the fire arm by means of a retractor which is pivotted to one side of the breech block, and is pressed upwards by a spring in time for its edge to pass under the lip of the cartridge case and withdraw it from the gun barrel when the handle is depressed.

The bent lever described also carries a projecting point, which presses upon the edges of the fluted shaft, and causes it to make a partial revolution by the movement of the handle of the breech block. By such partial rotation a fresh cartridge is brought forward and deposited upon the upper edge of the breech block and in front of a projecting part of the latter, which forces the cartridge into the breech of the gun barrel, and closes the latter when the handle is brought up into its place.

The fire arm is then discharged by drawing the trigger.

A.D. 1873, June 30.—No. 2270.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws.—(*A communication from John Newton Poage, of Cincinnati, Ohio, United States of America, gentleman.*)—"Improvements in watering-columns for railway water-tanks."

This invention consists principally in a watering column enclosed by and rotating within a vertical column. Also in the means employed for causing the discharge pipe to automatically return to and remain in position. Also in a valve, valve-seat, and chamber, combined with each other and with the surrounding casing to rotate freely upon a vertical axis. Also in the construction of the main valve, drain valve, casing, and the pipe for sustaining the said drain valve. Also in combining with the vertical portion of the watering column a smaller inner pipe for the passage of the valve rod. Also in the means for automatically closing the valve.

A.D. 1873, July 1.—No. 2281.

CHAPMAN, LUKE, of Collinsville, Connecticut, United States of America, machinist.—"Improvements in rotary pumps."

This invention has different modifications, but the one essential feature common to all of them is the use of a solid rotating cylinder or cylinders, hung within an outer cylindrical casing, and carrying in their peripheries round valves or buckets resting in corresponding sockets in the cylinders; these valves are separate from the cylinders and will turn from time to time so as to present different wearing surfaces. The valves extend so as to just touch the inside of the containing case. The space between the inner cylinder and the containing case forms the water way. The fluid is drawn in at one side of the pump and expelled at the other. In the first modification there are two inner rotating cylinders, one carrying valves and the other acting as a cut-off. The axes of the valves are hung in circlelets, which rotate with the valve-bearing cylinder and lie in the cap which close the ends of the pump. In the second modification there are two valve bearing cylinders, each equipped with two valves, the axes of which are hung in yokes lying in the ends of the cylinders. The third modification is just like the second, except that the valves are held to the cylinders by having the valve socket made larger than a half circle. The fourth modification is just like the first except that the circlelets in which the axis of the valves are hung are expanded into end plates for the cylinder, and the cut off has corresponding plates. The fifth modification is simply the first made double or compound, and the valves are held to the cylinders the same as in the third modification.

A.D. 1873, July 2.—No. 2284.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws.—(*A communication from Lester Eli Ross, of Providence, Rhode Island, United States of America, mechanic.*)—"Improvements in looms for weaving."

This invention relates to the shuttle motion of looms and is designed to furnish the power with which the shuttle is driven independently of the power and speed with which the loom is operated, the force that drives the shuttle through the warp is derived from a series of tension springs wound spirally upon a shaft, the ends of the said shaft being fitted into bearings and free to revolve in the same.

A.D. 1873, July 2.—No. 2287.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws.—(*A communication from Hugh Lee, of Beloit, Wisconsin, United States of America, mechanic.*)—"An improved safety attachment for reaping and mowing machines."

This invention consists in so combining the pinion by means of which the reciprocating movement of the knife or cutter-bar of a reaper and mower is transmitted to the same with the seat of the machine by means of levers that when the weight of the driver is on the seat the said pinion is thrown into gear to transmit motion to the cutter-bar while it is instantly thrown out of gear by removing the weight of the driver from the seat.

A.D. 1873, July 3.—No. 2311.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws.—(*A communication from Richard Lloyd, of New Orleans, Louisiana, United States of America.*)—"Improved processes and apparatus for distilling and barrelling turpentine and bleaching resin, and for other like purposes."

[No. 1.—4 PP.]

(8)

The first part of my invention relates to the distillation and barreling of turpentine, and to improved apparatus and appliances which I employ in developing the different stages of my process or operation. The second part of the said invention relates to the bleaching, clarifying, and refining of resin.

A.D. 1873, July 4.—No. 2322.

WULFF, JOSEPH, of the city and state of New York, United States of America, now of No. 8, Southampton Buildings, London.—“An improved fastener chiefly designed for shoes, gloves, and other like articles.”

The said improved fastener is composed of two curved links so constructed and pivoted together, and attached to the shoe or other article, that they may be folded upon or within each other.

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AND TO

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Curtis (<i>Gould</i>), 769 (<i>App.</i> 36.)
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Bonneville (<i>Maitre</i>), 2010 (<i>App.</i> 49.)</p> <p>Wrenches :
Buckley, 44.</p> <p>Wringing. See "Washing fabrics."</p> <p style="text-align: center; margin: 20px 0;">Z.</p> <p>Zinc (recovering). See "Metals (smelting)."</p> |
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CHRONOLOGICAL AND DESCRIPTIVE INDEX
OF PATENTS APPLIED FOR AND PATENTS GRANTED,

CONTAINING THE

ABRIDGMENTS OF PROVISIONAL AND COMPLETE SPECIFICATIONS

Delivered from January 5 to January 11, 1873.

A.D. 1873, January 6.—No. 57.

BURT, JOHN UTHUR, of Willow Row, Goswell Road, in the county of Middlesex, coach maker.—“Improvements in the mechanical arrangements for opening and closing carriage heads.”

This Provisional Specification describes the employing the ordinary outside joint and connecting it with the “cant” rail through the intervention of the revolving prop by a continuation of the said outside joint, such continuation being slightly curved, and having a slot at its extreme end working upon a bolt or screw connected with the cant rail or upper part of the roof to lower the head of a carriage. Also a method of lowering the head of a carriage by means of a cord and pulley; and of raising the head of a carriage by means of a coiled spring connected with a rod.

A.D. 1873, January 6.—No. 58.

WALKER, ANDREW, the younger, of Hartwood, in the county of Mid Lothian, North Britain.—“Improvements in steam boilers.”

The feature of novelty which constitutes this invention is—

The employment in boilers of projecting surfaces or grooves or tubes extending into the water space for the purpose of increasing the heating surface.”

A.D. 1873, January 6.—No. 59.

FOULIS, WILLIAM, of Glasgow, in the county of Lanark, North Britain, civil engineer.—“Improvements in charging and drawing retorts, and in the machinery or apparatus employed therefor.”

The feature of novelty which constitutes this invention is the employment of hydraulic cylinders for operating “scoops” or “rakes” for charging or drawing the retorts. The cylinders may be connected by telescopic joints, and may be operated with air, steam, or other fluid or liquid in lieu of with water pressure.

A.D. 1873, January 6.—No. 60.

TURNER, GEORGE, of Handsworth, in the county of Stafford, commercial traveller.—“Improvements in venetian blinds.”

According to this invention the blind, composed of wooden or metal laths, is suspended by chains passing over pulleys carried by a roller, one or both pulleys being provided with pins or stops for engaging with the suspending chains. By pulling one or other of the suspending chains the position of the laths may be adjusted so as to cause the blind to admit or shut out light.

Vertical chains are combined with the ordinary tapes to connect the laths together, and the said laths are supported by metal supports connected at their ends to the vertical chains. When the laths are made of metal and are brought into a nearly vertical plane they form an almost continuous sheet of metal, and by fastening the bottom lath to the window frame the laths are fixed in their vertical position, and the blind acts as a metallic shutter. The weight of the blind is balanced by a counterbalance weight.

A.D. 1873, January 6.—No. 61.

BREMERKAMP, CORNELIUS, of 706, Old Kent Road, in the county of Surrey.—“An improved method of removing by steam the bark from osier, willow, or any kind of rods, and also of improving their color, and in the apparatus for effecting the same.”

Placing the rods in a tank with perforated bottom, beneath or in connection with which is a boiler; the
[No. 2.] Price 4d. c

steam from the same passes into the tank, the cover of the latter being close fitting. The bark is loosened by the steam and ready for peeling in about fifteen to twenty minutes, the latter operation being performed by the "breaks" now in use, but lined with gutta percha in lieu of iron.

An improved color, as well as a greater toughness and pliability, is the result of the above operation, together with the great rapidity with which it is performed.

A.D. 1873, January 6.—No. 62.

GARON, FREDERICK, of Southend, in the county of Essex, builder.—"An improved stove for heating conservatories, baths, and similar purposes."

A small boiler made by preference of sheet copper, having the water between the plates of which it is constructed placed on a cast iron stand with sliding grating and ash pan, the latter having a perforated ventilator for regulating the fire inside the boiler. Union joints for the pipes for heating are placed on the side and top of the boiler.

A.D. 1873, January 6.—No. 63.

HUGHES, EDWARD THOMAS, of the firm of Hughes and Son, patent agents, 123 Chancery Lane, London.—(*A communication from Floris Van Loo-Wauters, of Brussels, in the Kingdom of Belgium, gentleman.*)—"An improved system and arrangements for towing canal-boats."

This invention is intended as an improvement on the ordinary and defective plans of drawing or dragging the canal boats or craft, either by horse power or tug steamers. For this purpose I employ a locomotive steam engine, travelling at a slow or accelerated speed on a railway laid down for the purpose on one of the canal banks or embankments.

A.D. 1873, January 6.—No. 64.

WILLIAMS, AARON WHITE COOK, of Paris, France, now of No. 8, Southampton Buildings, London, merchant and manufacturer.—(*A communication from George I. Capewell, of Cheshire, Connecticut, United States of America.*)—"An improved apparatus for extracting nails."

My invention relates to a simple, cheap, and efficient implement for extracting nails. The said implement has a hollow cylindrical stem. Firmly secured to the lower end of the said stem is a steel plug. The outer part of this plug forms a sharp pointed claw; affixed to this claw by a rivet is a second claw. From this second claw extends a curved arm which forms a fulcrum. Into the cylindrical stem I fit a rammer which may be moved freely within the stem, but is kept in position therein by a strap.

A.D. 1873, January 6.—No. 65.

WILES, JOHN FLETCHER, of Sun Court, Cornhill, in the city of London.—"Improvements in means or apparatus for securing the doors of railway carriages whilst a train is in motion."

The invention consists in mounting near each door of a carriage an electro magnet and an armature capable of engaging with a catch in the door of the carriage, and of being charged by a magneto-electric machine, carried by the guards' van, and set in motion by an axle which has no break applied thereto.

A.D. 1873, January 6.—No. 66.

JAYNOR, ALBERT, of Regent's Park, in the county of Middlesex.—"Improvements applicable to steering wheels, capstans, windlasses, and other like machinery employed for raising and lowering weights."

The features of novelty of this invention consist in constructing steering and hoisting gear with two cylinders, one fixed and the other loose upon it, also in cogging the inner periphery of one end of each cylinder, and gearing a pinion thereinto, the said pinion being carried by a crank or disc fixed on the spindle of the steering wheel, and moving therewith. The teeth on the fixed cylinder lock the outer cylinder when the steering wheel is not in use, and cause the loose cylinder to be turned round when the steering wheel is set in motion.

A.D. 1873, January 6.—No. 67.

ROBINSON, WILLIAM, of Brooklyn, in the state of New York, United States of America.—"Improvements in electro-magnetic railway signalling apparatus."

This invention relates to mechanism actuated by electricity, by which the approach of a railway train to a station, switch, drawbridge, or other locality is caused to automatically sound an alarm or display a signal to

indicate the approach of the train and its passage or movement relative to the station or other point along the track. The said invention involves the operation of such signals by a circuit controlled by the passage of the locomotive or carriages acting in concert with track sections disconnected from each other and arranged in connection with appropriate electro-magnetic appliances. In one modification of the said invention the several parts of the apparatus are so provided that the circuit in its normal range is caused to hold a visual signal out of sight until the wheels and axle change the circuit and allow the signal to be brought into position for display; also so that the changing of the circuit may automatically sound a bell; also so that the current will be divided between the said circuit and a secondary one; also so that the secondary circuit can be so arranged with regard to the signal devices operated thereby that by providing a diminished resistance the whole current will be diverted through the circuit thus constituted. A switch is also employed having its two rails insulated from each other in order to prevent the completion of a circuit at any desired places. Another modification of the said invention comprises the combination of the conducting wires of a battery with rail-sections separated from each other, whereby the wheels of a locomotive or carriage may be made to close or break the circuit that actuates the signal; also the use in connection with the wires and separated rail sections of a relay so constructed that the armature lever is actuated to change the current. The said invention also comprises a signal bell or audible signal operated by axial magnetism; also the use of stop chairs and non-conducting fish-plates; also for the protection of the batteries, signals, and other parts with a subterranean chamber or double walls.

A.D. 1873, January 7.—No. 68.

ARGALL, JOHN, of Adderbury, in the county of Oxford, mining engineer.—“Improvements in the manufacture of oil paints.”

This invention consists in giving body or opacity to the paint by using as a basis the natural mineral carbonate of baryta and zinc, or native zinc ore, to which carbonate of baryta is afterwards added. The zinc ore or the baryta and zinc mineral is subjected to a roasting process. The required colour or shade of colour is given to the paint by the addition of calcined ores of lead, tin, zinc, copper, iron, or manganese, to the compound or mixture.

By the use of baryta a peculiar glossy surface is given to the paint, and the said baryta also effects such rapid drying of the paint that the use of ordinary dryers is rendered unnecessary.

A.D. 1873, January 7.—No. 69.

ANYON, WILLIAM, yarn agent, of No. 82, Waterloo Road, Manchester.—“Improvements in construction and fixing of fire-grates for domestic and heating purposes in dwelling houses.”

The improvements consist in the employment of a moveable grid or set of bars turning upon a hinge at the back of the fire place, and the several bars thereof passing intermittently between fixed or rigid bars parallel thereto, such rigid bars running from back to front of the fire place, and continuing from thence in a vertical direction. Also in a modification thereof, whereby the moveable or rocking bars passing intermittently between the parallel fixed or rigid bars run from side to side of the fire place, irrespective of the front arrangement of bars, by which means considerable economy in fuel results.

A.D. 1873, January 7.—No. 70.

SMITH, GEORGE, of Cambridge Lodge, Brentford Road, Chiswick, in the county of Middlesex, gentleman.—“Improvements for ventilating boots, shoes, goloshes, and other coverings for the feet.”

This invention consists in an arrangement of tubes placed between the inner and outer soles, and opening outwards at the heel and inwards to the interior of the boot, shoe, or foot covering.

A.D. 1873, January 7.—No. 71.

LAW, JAMES, and LAW, SAMUEL, of the firm of Samuel Law and Sons, of Cleckheaton, in the county of York, card manufacturers.—“Improvements in cards for carding woollen, cotton, silk, and other fibres, and in the machinery or apparatus to be employed in the manufacture of the wire for such cards.”

The invention consists—

Firstly. In the application and use of wire in the manufacture of card teeth, shaped and compressed by the pressure of grooved rollers to the various forms hereinafter described, the teeth being set in leather or other substance as usual.

Secondly. The invention relates to the means of adjusting the grooves on the rollers relatively to each other, and for directing and guiding the wires to and between the grooves of the said rollers.

The forms (on cross section) of wire are plano-convex, convex or double convex, elliptical, semi-elliptical, oval or egg shaped, semi-oval or semi-egg shaped, rhomb or rhombus shaped.

The grooved rollers are mounted on shafts or spindles and work in bearings or necks; each end of each shaft is chased or screwed and provided with an adjusting nut. A conical guide is connected to a slide piece worked by means of an adjusting screw; through the centre of this guide the wire to be rolled is passed.

A.D. 1873, January 7.—No. 72.

CARMICHAEL, HENRY, of Leeds, in the county of York, bleacher.—“An improved process and apparatus for bleaching, dyeing, and washing linen, cotton, and other yarns and fabrics,”

My improved apparatus for bleaching and dyeing yarns has a boiling pan, two bleaching or dyeing vats, and four cisterns for containing the various liquids; a pump connected with these cisterns is so arranged that the contents of each of them may be raised into the bleaching or dyeing vats, and the latter are provided with valves whereby the liquid raised from either of the said cisterns may be allowed to return to it; over these vats I arrange a series of rollers geared with worms on shafts, which are geared to a driving shaft for the purpose of imparting a reciprocating rotary motion to the said rollers; the hanks of yarn are placed on the aforesaid rollers and hang with their lower ends in the vat; motion is given to the said rollers which pass the yarn alternately forward and backward through the liquor. Then the valves or cocks are opened and the liquor is returned to the cistern. The apparatus for bleaching, dyeing, or washing cloth or other fabrics, is substantially the same as that above described, but I use an additional series of rollers at the bottom of the vats, the cloth or fabric being passed over the upper rollers and under the lower rollers. At each end of the said vats I place a folding machine, and also a frame for plaiting the fabric.

A.D. 1873, January 7.—No. 73.

LAMB, JOHN WILLIAM, manufacturer, and LOWE, SAMUEL, machinist, both of Nottingham, in the county of Nottingham.—“Improvements in apparatus for transferring knitted fabrics to circular knitting machinery.”

This invention relates to means for facilitating the junction of ribbed work with plain work in the circular knitting frame, and it consists in the use of automatic apparatus for laying the ribbed work on to the needles of the circular knitting frame.

A.D. 1873, January 7.—No. 74.

ADAMES, CHARLES HENRY, of Birmingham, in the county of Warwick, manufacturer.—“An improvement or improvements in the manufacture of tea kettles.”

This invention consists in forming the body and bottom of kettles in one piece by stamping and afterwards affixing the top or neck in the usual way by brazing.

A.D. 1873, January 7.—No. 75.

CODD, HIRAM, of Grove Lane, Camberwell, in the county of Surrey.—“Improvements in the manufacture of glass bottles, and in apparatus employed therein.”

This Provisional Specification describes forming the ring or head upon the top of the neck before removing the bottle from the mould in which it has been blown.

A.D. 1873, January 7.—No. 76.

WILSON, WILLIAM, of Newcastle upon Tyne, hat manufacturer.—(*A communication from Rudolph Eickemeyer, of Yonkers, in the United States of America.*)—“Improvements in apparatus for the manufacture of hats.”

According to this Provisional Specification, hat bodies saturated with slightly acidulated water are placed in the mill enlarged to its full extent, sufficient to fill it loosely—the fall of the hammer is reduced to its minimum extent—as the felting takes place, the fall of the hammer is increased, and the space for the hat bodies diminished until the felting is completed—the invention also relates to a machine for pouncing hat bodies on the brim, or on the brim and crown, whilst the bodies are in the conical form—the invention also relates to a machine for ironing hats when on the finishing block, which is so arranged that the under brim, the upper brim, the side crown, square, and tip, may be ironed off at the same time, without any assistance.

from the operator—the invention also relates to machinery for pressing and shaping the hat at one operation, and consists of a press so constructed that the necessary pressure is produced by the closing of the two jaws of the press.

A.D. 1873, January 8.—No. 77.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London.—(*A communication from Isabella Waller, of Cleveland, Ohio, and Henry Fowler, of Detroit, Michigan, both in the United States of America.*)—"Improvements in hospital-beds."

This invention relates to a hospital-bed with an elevating frame so arranged that the patient may be lifted clear off the mattress and sheets without displacing his limbs or otherwise disturbing him.

A.D. 1873, January 8.—No. 78.

BAYNES, RICHARD, of Blackburn, in the county of Lancaster.—"Improved apparatus for heating the feed water of steam boilers."

The object of this invention is to economize fuel by heating the feed water to a temperature of (say) three hundred degrees or more before its admission into the steam boiler, and the nature of the said invention consists principally in constructing the bridge of the furnace in the form of a hollow metal chamber, through which the water is forced on its way to the boiler and becomes thereby heated to the required degree.

A.D. 1873, January 8.—No. 79.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Henri Seeling, of Paris, France, sewing machine manufacturer.*)—"Improvements in thread-spools for sewing, embroidering, and other machines."

I provide the ordinary spools with two small auxiliary discs, either plane or slightly concave, and of a larger diameter than the bases of the spool they are fixed upon. These two discs are formed with a central hole, somewhat like a spring-socket, which enters the central bore of the spool, and the said discs are thereby kept in position. When the spool thus modified is placed on its stationary pin or axis the thread can never be unwound otherwise than in the direction of the rotation.

A.D. 1873, January 8.—No. 80.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Henry Krausse, of Mainz, Germany.*)—"An improved apparatus for manufacturing illuminating gas."

The said improved apparatus has a cast iron turned cylinder, divided by a partition into two equal parts, the air pump and the carburetter. A hollow axle of wrought iron turns in a plummer block and stuffing boxes; upon this axle is fixed the screw-tumbler, and on its side is a chamber packed with horse hair and wrapped in linen or other porous stuff. On the axle is fixed a small pulley, corresponding with the pulley on the drum; an elbow pipe, provided with a light valve, establishes the communication of the pneumatic apparatus with the external air; a vane wheel regulates the motion; a regulator governs the pressure of the gas upon the burners; and by a threeway cock the apparatus is emptied of its contents.

A.D. 1873, January 8.—No. 81.

HARTLEY, RICHARD, of New Road Side, near Keighley, in the county of York, singer.—"Improvements in machinery or apparatus employed for singeing yarn."

This invention relates to improvements on "Kay's machine," and consists in constructing the machine with two or more series of pulleys over which the yarn is caused to pass, and these pulleys are arranged so as to change the course or line of travel of the yarn, so as to direct the same several times through or over the flame.

A.D. 1873, January 8.—No. 82.

RYDILL, GEORGE, of Grove House, Dewsbury, in the county of York.—"Improvements in drying machines for drying animal and vegetable substances, earth, and compositions, part of which are also applicable for furnace bars and other purposes."

This invention relates to various arrangements of improvements in the construction of machinery and

apparatus for applying steam or heated air for drying animal and vegetable substances, earths, and compositions, causing material which is placed on a feed board at one end of the machine to be delivered over rollers or tubes at the other end of the machine in a dry state. Part of this invention of improvements is also applicable, and may be applied as furnace bars and for other purposes.

A.D. 1873, January 8.—No. 83.

WILEY, WILLIAM EDWARD, of Birmingham, in the county of Warwick, manufacturer.—“Improvements in coating metals, and in machinery or apparatus used for that purpose.”

This invention consists in coating small metallic articles such as dress pins with tin or alloys of tin, zinc, and the like, in the following manner:—

In coating with tin, according to this invention oil or fat together with chloride of zinc are placed in a heating pot having a rotary or oscillatory motion, and when the fat or oil is sufficiently heated the pins and metallic tin are thrown into the pot, which is turned or oscillated for a few seconds. The pins are thereby coated with tin and are raked out of the pot into a vibrating riddle or sieve through which they fall into water.

Or a tubular heating pot may be used, the pins being introduced at one end and removed at the other end, the pins being carried through the rotating pot by a screw like motion effected by a screw like rib in the interior of the pot.

A.D. 1873, January 8.—No. 84.

SCHOEVERS, ALEXANDER TIMON CORNELIS, of the Hague, in the Kingdom of Holland, surgeon.—“Improvements in trusses for the cure or relief of hernia.”

This invention refers wholly or mainly to the pad or cushion of trusses, and consists in making the said pad or cushion as follows:—

The back of the pad is made of a series of radial spring arms connected to a central plate, the springs and plate having a dome like figure, the outline of the dome being either circular or elliptical. Within the dome or spring back is a conical coiled spring. The parts described are contained within a case or cover of vulcanized india rubber. The pad is so connected to the spring band passed round the body of the person using the truss as to allow the pad considerable range of motion about the end of the spring band. The face of the pad is slightly convex, the central part projecting considerably by the action of the conical spring.

In using the truss the central part of the face of the pad is applied to the centre of the rupture, the said pad being pressed by the spring band against the body. The edge of the pad is thereby pressed all round against the body, and the position of the pad fixed by the hold which its edge acquires on the flesh of the part to which it is applied.

By these improvements the pressure of the truss is applied to the rupture at the precise point required, and the truss is not liable to displacement by the motion of the body of the wearer.

A.D. 1873, January 8.—No. 85.

HIGHTON, HENRY, M.A., of Putney, in the county of Surrey.—“Improvements in electric telegraphs.”

This Provisional Specification describes the use of the gold leaf instrument with induced currents, the line current being the primary. Also the use of the gold leaf instrument with line currents giving different signals by difference of intensity.

A.D. 1873, January 8.—No. 86.

WHITWELL, THOMAS, of Thornaby Iron Works, Stockton on Tees, in the county of Durham.—“Improvements in register and other fire-places.”

This Provisional Specification describes arranging at the back of a fire, tubes opening at their ends into closed chambers, one in communication with the outer air, the other with the interior of a room or building in order to keep up a constant supply of warm fresh air.

A.D. 1873, January 8.—No. 87.

CHISLETT, JOSEPH RALPH, of Plymouth, in the county of Devon, machinist.—“Improvements in apparatus for employing electricity for curative and remedial purposes, and in appliances to be used in connection therewith.”

The electro-magnetic instrument is formed with a conical coil of insulated wire, spirally arranged, and placed horizontally, and capable of allowing a central column or core, composed of soft iron, to be introduced within the same, and which core becomes an electro-magnet when the instrument is placed in connection with the battery or batteries. The core is capable of being inserted or withdrawn. The spiral conical coil is so wound that it forms a gradation or series of parts commencing with a given diameter at the small end, and gradually increasing in diameter towards the larger end of the coil. By inserting or withdrawing the soft iron core the force of the electric current can be readily proportioned to the requirements of each particular case.

The appliances to be used in connection with the apparatus consist of metallic plates so formed as to be capable of being applied to those parts of the patient to which it is desired to apply the electric current, and for that purpose are placed when used, in electric circuit with the apparatus.

A.D. 1873, January 8.—No. 88.

STEINHOFF, GODFREY, of Suffolk Lane, Thames Street, in the county of Middlesex.—(*A communication from H. Schmidt, of Schindler's Werk, near Schneeberg, Saxony.*)—"A new or improved construction of "hammer for impressing or printing numbers, letters, or other marks in or upon timber and other substances, "and an improved inking or coloring apparatus in connection therewith."

This invention relates to apparatus for marking timber and other substances with successive numbers, letters, or signs, and its essential feature is the use of numbering or lettering wheels or rings in the form of a hammer. A first or unit wheel is operated by a lever parallel with the handle of the hammer, so as to revolve and present its numbers (or letters) successively at the striking face. A second wheel, or wheel of tens, is turned by hand to bring its numbers successively to the striking face, and there may be a third wheel for hundreds, a fourth for thousands, and so on, all moved like the second wheel; or in lieu of the third and succeeding wheels slides are used to receive a single type as may be required.

The invention also embraces a portable pad for inking or coloring the striking face of the hammer. This apparatus is so arranged that it may be strapped round the waist of the hammerer and rest against his left thigh, and that the pad is self-inking, and always ready for use.

A.D. 1873, January 8.—No. 89.

NEWTON, WILLIAM EDWARD, of the office for patents, 66, Chancery Lane, in the county of Middlesex, civil engineer.—(*A communication from Paul Doury, of Paris, in the Republic of France.*)—"Improvements "in water wheels and in mounting the same, parts of which improvements are also applicable to mounting "other driving shafts."

Constructs water wheels so as to bring the water to the wheel and cause it to act in such a manner on the float boards that the water will produce a greater effect, and will produce a greater motive power than with wheels of the ordinary construction. In order to reduce the friction of the central shaft or axle in its bearings, it is either supported on anti-friction rollers, or it is provided with flanged rollers on each side of the wheel.

A.D. 1873, January 8.—No. 90.

NEWTON, WILLIAM EDWARD, of the office for patents, 66, Chancery Lane, in the county of Middlesex, civil engineer.—(*A communication from Leven Shreve Goodrich, of Waverly, in the state of Tennessee, and John Hartwell Hillman and George Washington Goodrich, both of Trigg Furnace, in the state of Kentucky, United States of America.*)—"Improvements in puddling furnaces."

The invention consists mainly in the use of a portable fire-box for supplying heated air to a revolving puddling furnace, which is rotated by means of a screw.

A.D. 1873, January 8.—No. 91.

KONN, STANISLAS WIKENTJEVITSCH, of the firm of S. A. Kosloff and Company, of Great Winchester Street Buildings, and of St. Petersburg, in the Empire of Russia.—(*A communication from Alexandre Nicolaevitch Lodighin, of St. Petersburg, in the Empire of Russia.*)—"Improvements in producing heat by electricity."

This refers to the employment of solid stems of carbon within hermetically closed vessels containing azotic or other gas, by which the carbon stems are not decomposed as at present, where two carbon points are used for the purpose.

A.D. 1873, January 8.—No. 92.

MACAULAY, HENRY, of Kingston upon Thames, in the county of Surrey, Captain 5th Royal Lancashire Militia.—“Improvements in breech-loading small arms.”

The main points in this invention are—

1. Centring falling breech block in advance of the barrel end.
2. Actuating breech block by an outside lever, which also sets the hammer and pieces adjacent.
3. Special fixation of extractor to the hammer.
4. Compact arrangement of parts upon the trigger-plate.

A.D. 1873, January 8.—No. 93.

HODSON, HARRY FARNCOMBE, of Hayward's Heath, in the county of Sussex.—“Improved combination implements for gardening and other purposes.”

The implement is made with a shank and arms somewhat like an anchor in shape. The ends (one or both) of the arms are forked for removing weeds, or one end may be formed as a hammer head, and a knife edge is provided on the inside of one or both of the arms for cutting and lopping.

The shank may be serrated on one side for sawing, and on the end is formed a spud for weeding and edging. The tool is also useful for raking, hoeing, drilling, and other purposes.

A.D. 1873, January 9.—No. 94.

ROBERTS, LLEWELLYN, of Stockton-on-Tees, in the county of Durham, mill manager.—“Improvements in the manufacture of rails for railways.”

Rolling and splitting crop ends from rails into shoulder or angle pieces, and using such pieces in making up pile.

A.D. 1873, January 9.—No. 95.

GAY, PAULIN, of Rue de Grammont, No. 11, at Paris, civil engineer.—“Improvements in machinery for cutting or excavating coal, stone, or other minerals.”

This invention consists in improved modes of giving the cutting tools a revolving and advancing motion at the same time, for the purpose of making slots or mortices at the sides or other parts of the seam or gallery of the mine or rock, and also in improved arrangements and contrivances for enabling the machinery to be comparatively light in weight, easily moved from place to place, quickly fastened, and its parts changed as required with ease and expedition.

A.D. 1873, January 9.—No. 96.

HUGHES, PRYCE, of 14, London Street, Hyde Park, in the county of Middlesex.—“Improvements in the construction and formation of dishes and plates.”

The dishes and plates are formed with the bottom rim or bezel of a greater height at one part than at another, in order to tilt the top surface upon which the meat is ordinarily placed.

The top surface may also be formed with an inclination, by the bottom being made thicker at one part than at another.

A.D. 1873, January 9.—No. 97.

THWAITES, RICHARD, of 36, Waterloo Road, Lambeth, in the county of Surry, and STEVENS, LOUIS ARTHUR, of 411, Peckham Park Road, Camberwell, in the county of Surry.—“Improvements in corks and in the form of the necks of bottles to be used with the same, and the method of using the same for bottling liquids.”

The novelty consists in using conical shaped corks weighted at the smaller end fitted to bottles having the upper part of the neck tapered towards the mouth or aperture. The corks are first forced into the bottles; the liquid is afterwards filled in; the bottles being inverted the corks fall to their places in the necks, and are drawn tightly into the taper part by any suitable appliance. Great facility for opening is gained, and the use of corkscrews done away with, besides avoiding the danger of bottles breaking at the neck under the strain required to open them when corked in the ordinary manner.

A.D. 1873, January 9.—No. 98.

BOYNTON, LEANDER WOLCOTT, of the city and state of New York, United States of America, now of No. 8, Southampton Buildings, London, engineer, and HOLMES, JOSEPH ELLICOTT, of Vowler Street, Walworth Road, in the county of Surrey, civil and mechanical engineer.—“Improvements in centrifugal machines and in kilns and apparatus connected therewith for drying and charring peat and for other like purposes.”

Our invention relates first to a centrifugal drying machine in which the peat or other substance to be treated is placed, to be deprived of the liquid contained in it, or the greater portion of such liquid. The said invention relates, secondly, to kilns or ovens and apparatus connected therewith in which the peat or other substance after being dried or partially dried in the said machine and made up in blocks or cakes is charred or baked and thereby rendered suitable for fuel or for other desired purposes.

A.D. 1873, January 10.—No. 99.

COWLES, EDWARD, of Hounslow, in the county of Middlesex.—“Improvements in cooling candle moulds, and apparatus therefor.”

This invention relates to a method of and apparatus for cooling candle moulds. The set of moulds mounted in a frame is enclosed in a casing, or frames already provided with water casings are employed. Through these casings a current of tempered air is forced by a fan or otherwise. For an establishment where there are many frames, the air is cooled by ice or evaporation, or warmed by hot water or steam pipes, or by flues or a jet of steam, and led by a main conduit to the several casings which are provided with stopcocks or valves to regulate the air current through them.

A.D. 1873, January 10.—No. 100.

SOWERBUTTS, ALFRED, of No. 6, Waite Street, Trafalgar Road, Old Kent Road, in the county of Surrey.—“Improved apparatus for raising sunken vessels and other submerged or partially submerged bodies.”

This invention consists in employing air-tight casks, filled with water and chemicals, and furnished with internal self-acting mechanism, which, when adjusted, will after a certain time allow the chemicals to mix, thus generating gas and expelling the water by means of valves, and rendering the casks buoyant. A number of the casks with contents as described, when placed in the interior of or attached to a sunken ship, will raise it to the surface. For partially raising a floating vessel, pontoons containing the self-acting mechanism, chemicals, and water are employed in pairs, and are connected by chains to winches attached to floating buoys. The winches when acted upon will regulate the depth to which the pontoons are sunk, and the said pontoons are then placed in a position beneath the floating ship to be raised. The self-acting mechanism may sometimes be attached to a case of compressed air or gas, the liberation of which in the interior of a cask or pontoon will expel the water, and the said mechanism may also be acted upon from the exterior of the casks or pontoons.

A.D. 1873, January 10.—No. 101.

SOUL, MATTHEW AUGUSTUS, of No. 6, Southampton Buildings, Holborn, in the county of Middlesex, consulting engineer and patent agent.—(*A communication from Jean Roturier, of the parish of Bayon, Gironde, in the Republic of France.*)—“A new or improved mechanism for turning the leaves of music books.”

The chief feature of novelty which constitutes this invention is the turning of the leaves of music books by means of an arrangement of intervening and connecting mechanism, so that it will no longer be necessary to stop playing to turn the pages by the hand.

A.D. 1873, January 10.—No. 102.

KININMONTH, JOHN, of Kirkcaldy, in the county of Fife, North Britain, baker.—“Improvements in heating bakers' ovens, and in the apparatus employed therefor.”

The feature of novelty which constitutes this invention is the application of a blast of air forced by a fan into the fires of bakers' ovens for intensifying or regulating the temperature.

A.D. 1873, January 10.—No. 103.

SEIFERHELD, ALBERT, of Albion Works, Lansdowne Road, Hackney, in the county of Middlesex.—(*A communication from Adolphe Deregnacourt, of Paris, France.*)—“Improvements in machinery or apparatus for blocking the soles and heels of boots and shoes, and improved apparatus in connection therewith.”

This invention relates, Firstly, to an arrangement of mould and die, whereby at one stroke of a press, the entire sole of a boot or shoe may be blocked to shape, a sharp edged "shank" given to it, and any ornamentations and perforations that may be required, Secondly, to an arrangement of mould and die or mandrel, whereby the heel of a boot or shoe may be shaped at a single stroke of a press and, Thirdly, to a modification of the knife used for cutting the "lifts" of the heel, which modification consists in giving it an outside instead of an inside edge as hitherto.

A.D. 1873, January 10.—No. 104.

GEDGE, WILLIAM, EDWARD, of No. 11, Wellington Street, Strand, in the county of Middlesex, patent agent.—(*A communication from Georges Thomas de Kercado, of No 64, Faubourg St. Martin, Paris, France.*) —"A new or improved water meter."

This water meter is composed of a closed tank or reservoir having at its upper part a syphon pipe for admission of water, and at its lower part a pipe for drawing it off. Within the upper part of this reservoir is a receiver, its bottom carried by a lever, the opposite end of which is counterweighted. This receiver has a funnel shaped cap, into which dips the syphon pipe and which is also provided with a valve carried by a rod resting against the moveable bottom of the receiver.

The water from the main having run into the closed reservoir until the compression of air at its upper part will permit no further influx; when the cock on the pipe by which water is drawn from the reservoir is opened, the bottom of the receiver pivots, and the water in the receiver passes into the reservoir, during which movement, the lever striking against a rod, moves an index and thus registers upon a dial the emptying of the receiver; the moveable bottom in pivoting ceases to uphold the valves on the funnel shaped cap, so that it comes down and closes the communication between the funnel and the body of the receiver, and that the water arriving at this moment from the main is held in the funnel. The water having passed from the receiver to the reservoir, the counterweight again brings up the bottom, the receiver refills, is again emptied, and so on continuously until the cock on the exit pipe is closed.

The quantity of water necessary to overcome the resistance of the counterweight having been ascertained, the number of movements registered upon the dial gives the exact quantity of water drawn from the reservoir.

A.D. 1873, January 10.—No. 105.

KNOWLES, MARK, and BARNES, DAVID, trading as "Mark Knowles & Co.," of the Walpole St. Iron Works, in Blackburn, in the county of Lancaster, machinists and ironfounders.—"Improvements in looms for weaving."

The first part of this invention relates to the damping of the warp in the loom. It consists of a roller revolving in a trough of water, which may be mixed with other substances; the roller is placed so that the yarn may pass over it and cause it to turn and so convey the moisture. Or another roller is placed on the one before named, and the yarn is made to pass over it instead of over the other. Or, if desirable, one or both rollers are covered with cloth or leather. Or the yarn is caused to pass between the two rollers. It is preferred that the bearings of the bottom roller, or the trough itself, be placed on springs; or the trough is made with journals, and worked as a vibrating back bearer.

The second part of this invention is a taking-up motion. It consists of a toothless wheel and a lever carrying one or more pauls, fitting in notches in the lever boss, and resting on the periphery of the wheel; a spring pulls each paul down in its notch and on to the periphery of the wheel; the axis of the wheel is concentric with that of the lever, and the notches are a little to one side of a line drawn from the axis of the lever to where each paul touches the periphery of the wheel; this causes the pauls when the lever is moved one way to slip on the periphery of the wheel, but when moved the other way to bind hard upon the periphery of the wheel, and force it to turn like a catch does a ratchet wheel; the lever is formed with a slot and carries a pin, receiving motion from the slay sword, or from an eccentric or crank on the crank shaft, or in any way common to taking-up motions, and which may cause the lever to oscillate. If the pin is moved nearer to or further from the axis of the lever, it gives a greater or less motion to the toothless wheel, which thus makes a revolution with a greater or less number of oscillations of the lever. The toothless wheel is either placed on the journal of the taking-up roller or on a stud, in the latter case a wheel is attached to it, working in others driving the taking-up roller. There is a fixed boss carrying one or more pauls, same as those before named, and acting as holding catches upon the toothless wheel; in contact with these pauls is a small lever, which, when lifted, throws the pauls out of action. The cloth is taken up either by wrapping it on a roller resting or pressed against the taking-up roller, or it is wrapped on the taking-up roller, and a rod or

roller is placed across, resting or pressed against the cloth, and having a connecting link to the pin in the taking-up lever. As the roll of cloth becomes larger it moves the rod or roller, which in turn moves the pin to a greater distance from the axis of its lever, and this moves the taking-up roller as much less as will compensate for the larger diameter of the roll of cloth. A presser acts on the roll of cloth so that it may be firm and solid to move the rod or roller accurately.

A.D. 1873, January 10.—No. 106.

PRITCHARD, GEORGE, of Smethwick, in the county of Stafford, tube maker.—“Improvements in machinery for straightening, smoothening, and finishing round metal tubes and bars.”

According to this invention the tube or round solid bar is passed between a series of rollers in following manner.

The tube or bar to be straightened, smoothened, and finished according to these improvements is passed between a group of three friction rollers, with its length in the same direction as or parallel with the axes of the rollers.

Only one group of rollers, or a series of two or more groups of rollers may be employed.

One or more of the rollers must be driven so as to revolve on its axis for the purpose of making the tube or bar revolve, or instead of the tube or bar revolving the whole group of rollers may be arranged so as to revolve around the tube or bar.

The machine is arranged in such manner that the rollers can be moved nearer to or farther from one another so as to take different sized tubes or bars, and when in operation they are caused to press sufficiently upon the tube or bar to produce the desired result.

A.D. 1873, January 10.—No. 107.

PAGE, ROBERT WILLIAM, of 24, Featherstone Buildings, High Holborn, in the county of Middlesex.—“Improvements in apparatus for cutting screws.”

A chuck with a thread on the outside is screwed on to the mandril of a lathe. Two pieces of metal are fastened to the bed plate bending inwards supporting a rod to which is fixed a bar of metal at right angles, to one end of which a nut is fastened forming one half of female screw, and on this bar is placed a socket of metal into which is fastened a bar bent at right angles—this bar and socket move easily on the long rod above mentioned and fixed at any part by a screw. To the table of the lathe or other convenient part, a rod is fastened by one of its ends and moves radially between the bed of the lathe and the long rod and has guides and stops and has also a cross piece at right angles. This rod is used as a lever and placed so that the cross piece is under the rod with the half nut attached, and by moving this bar, the rod with the nut comes into contact with the male screw on the chuck or the reverse. To facilitate the action a weight is placed on the end of the half nut.

A.D. 1873, January 10.—No. 108.

DONISTHORPE, RODERIC FLOWER, and CLARKE, THOMAS ALFRED WILLIAM, both of Leicester, in the county of Leicester.—“Improvements in the manufacture of crimped hair, and in apparatus employed therein.”

Hair is formed into a continuous roving or sliver and is by automatic apparatus plaited or twisted around strings or wires; it is afterwards boiled and dried in the ordinary way.

A.D. 1873, January 10.—No. 109.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from Marie Eugène Paul Audouin and Eugène Philippe Pelouze, both of Paris, France.*)—“An improved method of and apparatus for condensing liquefiable matters contained in gases and vapors.”

I effect the condensation of the matters by bringing them in intimate contact with each other or with solid surfaces in apparatus provided with orifices or slits through which the gas or vapor is projected in the form of jets which are made to impinge on a flat surface, whereby the condensation is effected.

A.D. 1873, January 11.—No. 110.

COLE, FREDERICK, of No. 136, Albany Road, Camberwell, in the county of Surrey, and ACTON, RALPH GEORGE, of No. 99, Thames Street, Greenwich, in the county of Kent, engineer.—“Improvements in apparatus and arrangements for using air as a motive power.”

A closed vessel containing a compressing apparatus (provided with arrangements for cooling the parts), and worked by one or more levers and weights actuated by the engine driven by the compressed air, which engine is worked by the compressed air from the closed vessel.

A.D. 1873, January 11.—No. 111.

STELL, SAMUEL, of Brunswick Street, Keighley, in the county of York.—“Improvements in apparatus for the prevention of dense smoke being emitted from the chimneys of steam boiler and other furnaces, and for economising the fuel consumed in such furnaces.”

In order to prevent dense smoke being emitted from the chimneys of flues, air is admitted to mix with the products of combustion immediately after feeding or stoking, the effect of which is to produce inflammable combustion of the gases, extending into the flues, by which the temperature of those flues becomes raised beyond what would be the case if the smoke and gases were allowed to pass away unconsumed; but if the admission of air is continued after the combustion of such smoke, and when the fuel has become incandescent, a loss of heat takes place.

The object of the invention is to obtain a self-acting regulation or stoppage of the supply of air to the products of combustion by the employment of metallic connection applied in the flues, so that as the combustion of the smoke and gases in those flues ceases, or the fuel becomes incandescent, such connection may act by its contraction on cooling to close the passages for air to act on the products of combustion.

A.D. 1873, January 11.—No. 112.

ULLMANN, SOLOMON, of No. 94, Regent Street, in the parish of Saint James', and county of Middlesex, tailor.—“Improvements in trousers and their suspenders.”

The trousers are made with a waist band, at each side of which are attached two leather straps, to these the suspenders are united by buckles.

The suspenders are made of cloth, elastic, or other tissue, and adapt themselves to the shoulders, the ends crossing under the arms, or they may be separate, as desired. The upper part is in the form of a yoke.

This system produces an equal balance throughout the garment, adding greatly to the appearance, and combining freedom to the chest and support to the shoulders. The trousers can be worn three inches longer in the leg, avoiding looseness in the seat and fork, and doing away with the extreme pressure felt by the old method when the trousers were braced up high.

No strain or tightness is felt at the fork whilst stooping or sitting; or running up the leg; or bulging at the knee: in the present case, the suspenders being braced at the side instead of crossing them over the back and bringing them straight in front, these drawbacks are obviated.

A.D. 1873, January 11.—No. 113.

AYLWARD, FRANK, of Canonbury, in the county of Middlesex.—“Improved apparatus or means to be employed in lowering and disengaging ships' boats.”

To one of the davits by which the boats are suspended I hang a single pulley block, and to the other a double pulley block, and attach to the ends of ropes suspended from these blocks self-acting caliper devices, which engage with staples or hooks fixed in the inside ends of the bottom of the boat, and so suspend but securely hold the same.

When the boat is to be lowered and disengaged, one of the men therein stands at one end thereof and lets out the davit ropes, which pass round a controlling roller so that he has thorough command over them and over the double pulley block, the one nearest him; and when he has lowered the boat so that it reaches the water, the upward pressure of the same causes the staples or hooks to open the calipers, which when sufficiently opened are held so by a catch, and so the boat is disengaged and let go free.

A.D. 1873, January 11.—No. 114.

CHARLESWORTH, GEORGE, of Cross Pipes, Denby Dale, near Huddersfield, in the county of York, power loom tuner.—“An improvement in power looms.”

The invention consists in the substitution of a movable iron or steel bar or picking rod for driving the shuttles in power looms (or in hand looms, which are fast going out of use) in lieu of the leather picking rod now used.

A.D. 1873, January 11.—No. 115.

HOLMAN, STEPHEN, of 10, Laurence Pountney Lane, in the city of London, engineer.—“Improvements in gas retort mouthpieces, lids, and fastenings.”

This invention consists mainly in a novel method of securing lids (whether of wrought or cast iron) to the mouthpieces of gas retorts, either with or without the aid of crossbars, and in grooving the bearing surfaces of either the mouthpieces or the lids, and making the lids reversible (when round or oval in form).

The lids are made reversible (when used with crossbars) by means of a moveable centre piece which is so fitted as that it can readily be applied to either side of the lid, and may form any determined proportion of the disc of the lid; the lids are also made with rims considerably wider than the thickness of the disc, faced true on either side with one or more grooves, except when the mouthpiece is grooved, in which case the faced portions of the reversible lid may be faced plain.

Hinged staples or catches are used in order to reduce the friction and power required to fasten the lid.

These hinged catches work on eccentric pins for either the adjustment of the catch or the fastening of the lid.

Double joints with outer jaws of the usual form are made to work with eccentric action by fitting an enlarged pin in the middle portion of the joint and making a hole in it at any determined radius from its centre to receive an ordinary hinge pin, which also passes through the outer jaws of the joint.

Suitable lugs are cast on the mouth-pieces, instead of fitting wrought iron lugs fitted in the ordinary way thereon.

A.D. 1873, January 11.—No. 116.

KING, JAMES ALEXANDER, of Glasgow, in the County of Lanark, North Britain.—“Improvements in the manufacture of peat-fuel and in the machinery or apparatus employed therefor.”

The feature of novelty which constitutes this invention is the treatment of peat in a pug mill so as to disintegrate it thoroughly, after which it is compressed into solid blocks and dried for use.

A.D. 1873, January 11.—No. 117.

WRIGHT, THOMAS, of the town and county of the town of Nottingham.—“Improvements in jacquard apparatus.”

The invention consists in substituting for the “droppers” usually employed to operate the gimp bars a set of pins working in perforated sleys, whereby the arrangement of jacquard apparatus is much simplified and greater accuracy is obtained in its operation upon the thick thread or warp or gimp bars of the lace machines.

A.D. 1873, January 11.—No. 118.

JONES, WRIGHT, of Manchester, in the county of Lancaster, engineer.—“Improvements in valves for regulating the flow of steam, water, and other fluids.”

This invention consists in an arrangement whereby the valve used for regulating the flow of fluids is placed in equilibrium or nearly so.

A.D. 1873, January 11.—No. 119.

GIBSON, RENWICK HUSTON, of King Street, Cheapside, in the city of London.—(*A communication from Alfred H. Andrews, of Chicago, in the state of Illinois, United States of America.*)—“Improvements in the construction of desks and seats, applicable to the use of schools and other purposes.”

Iron frames support a desk board, and to their front edges, which are suitably curved, is attached the back of a seat, consisting of a series of strips having transverse dovetailed grooves, fitting upon corresponding

dovetailed ribs upon the frames. The desk board may be made and fitted in the same way. In front of the seat back hinges are formed upon the frames, which carry hinged bars, upon the upper curved edges of which a seat is attached, formed of similar strips having transverse dovetailed grooves fitting upon dovetailed ribs upon the bars. The bars and seat are supported when turned down by projections upon them and upon the frames, and the hinges contain projections which compress india-rubber blocks between them when the seat is pressed down.

Reversible foot rails are attached to the frames by means of adjustable centres, and ink vessels are used held down upon the desk boards by hollow glands, and covered by plates turning horizontally.

A.D. 1873, January 11.—No. 120.

CANNING, SIR SAMUEL, of 7, Great Winchester Street Buildings, in the city of London, civil engineer.—“Improvements in apparatus for transmitting signals, applicable as steering, and engine room telegraphs.”

This invention relates to a peculiar construction and arrangement of telegraphic apparatus, especially applicable to ships for conveying messages to and from the engine room and bridge, or other part of the ship.

The said apparatus consists essentially of three distinct instruments, namely, the communicator, the indicator, and the reply instrument.

The improvements as regards the communicator, consist in arranging the various orders or signals round the surface of the brass head of the instrument, in lieu of as heretofore, on the face of the instrument only.

The indicator may be of the usual construction with the exception that in the case of an engine room apparatus it is made separate and distinct from the reply instrument. The reply instrument consists of a case with an illuminated dial in front, and a lever handle for turning the chain wheel, which transmits the movement through a chain, back to the ordinary loose wheel of the communicator; or a handle may be fixed upon the indicator shaft, the signal from the communicator being indicated by the handle of the indicator, and the reply by the handle of the communicator. In adapting the reply instrument to the rudder, a horizontal cross bar attached to the rudder head, such bar being made with right and left screws on opposite ends, on which traversing nuts are mounted. To the said nuts are attached the reply chains, which lead back to the communicator, and by suitably adjusting the positions of the nuts, the movement of the rudder may be made to produce the exact required movement of the reply pointer or handle in the communicator.

A.D. 1873, January 11.—No. 121.

HARRISON, CHARLES, and PEARSON, WILLIAM, both of Old Change, in the city of London.—“Improvements in the construction of frames for umbrellas, parasols, and sunshades.”

This invention consists in the construction of a compound collar formed of metal and connected with the “runner” of an umbrella, parasol, or sunshade, for the purpose of retaining the frame in any desired position. The collar consists of two parts, each of which has an aperture bored or formed therein, such apertures being circular but placed eccentrically with reference to the peripheries of the respective parts. One part of the collar is fixed to the end of the runner and has a screw thread on its periphery. The other part is in the form of a cap, in the interior of which is a screw thread capable of gearing into the thread on the exterior of the fixed portion of the collar. By turning the cap the circular apertures can be brought to coincide, when the “runner” will be free to move up and down the stick, or they may be placed eccentrically with regard to each other, when the edge of the aperture in the cap will press against the stick which is furnished with grooves for its reception, and the frame will be retained in the desired position. The collar is provided with a suitable pin or stop for the purpose of preventing the cap being turned too far and becoming detached.

A.D. 1873, January 11.—No. 122.

CRISPIN, WILLIAM HENRY, of Stratford, in the county of Essex, copper smelter.—“Improvements in apparatus to be used in connection with reverberatory and other furnaces.”

This invention consists.

Firstly. In the employment of a revolving screw, or scoops or arms to convey the ore into the furnace through the arch in any desired number of streams in front of the furnace bridge.

Secondly. In the employment of a revolving screw, or scoops or arms for the purpose of feeding the fuel through the arch of the furnace in a continuous stream.

Thirdly. In forming the furnace bars of a circular section, and in casting or keying a cog wheel on to the

end of each bar, such wheels gearing into a worm wheel which is caused to revolve by any suitable motive power, the bars being thereby also caused to revolve, and so to cleanse each other and prevent the formation and adhesion of clinker.

And fourthly. In the employment of a cylinder placed at or near the tap hole of the furnace, the same being caused to revolve. The ore is allowed to flow in a liquid state into the cylinder, and by the rapid revolution of the latter is disintegrated and reduced to fine particles. A blast of cold or heated air is introduced into the cylinder during its rotation.

A.D. 1873, January 11.—No. 123.

MILLS, JOSEPH LEWIS, of 23, Grafton Street, Fitzroy Square, London, and MONKHOUSE, THOMAS STEWART, of 27, Regent Square, London, W.C.—“Improvements in printing, and in apparatus for cutting “the printed matter at the same time.”

The novelties of our invention consist chiefly in the printing of two separate sheets, or of the surfaces of two separate rolls of paper, card, or other material at the same time, from the same form or forms, and in the cutting up of such said paper, card, or other material into the required lengths and breadths in the same machine, and during the process of printing as aforesaid.

A.D. 1873, January 11.—No. 124.

SMITH, THOMAS JAMES, of the firm of Robertson, Brooman, and Company, of 166, Fleet Street, in the city of London, patent agents.—(*A communication from Napoleon Felix Boreiko de Chodzko, of Rue de Babylone, No. 58, Paris, engineer.*)—“Improvements in locomotive and other boilers, and in means of “effecting economy in the consumption of fuel therein.”

This consists in replacing the ordinary fire box by a long double grate arranged below the tubes, the lower part of which serves to burn the scoriae and half consumed matters proceeding from the upper part, upon which the fresh coal is burned. As the hot gases proceeding from the furnace pass into the tubes at the front of the machine, they are forced to effect a double circulation by placing in the middle of the heating tubes a large return conduit which receives the heated gases and leads them into the chimney, thus utilizing their heat a second time.

A.D. 1873, January 11.—No. 125.

WALPOLE, JONAS, of Antingham, near North Walsham, in the county of Norfolk.—“Improvements “applicable to double furrow ploughs.”

The features of novelty of this invention consist in forming each beam in two parts and hinging such parts together, also in attaching one end of a chain to an iron fork fixed under the foremost divided parts of the beams, the aforesaid chain being connected by its opposite end to a hinged lever under the control of the ploughman, who by pulling it lifts up the hinged parts of the beams and thus causes the plough shares to be lifted and held free of the ground when the plough is not required to be at work.

A.D. 1873, January 11.—No. 126.

HASELTINE, GEORGE, of the “International Patent Office,” Southampton Buildings, London, Doctor of Laws.—(*A communication from Samuel Hatt Haycock, of Ottawa, Canada, civil engineer.*)—“Improvements in projectiles for rifled fire-arms and ordnance.”

The said invention consists in an elongated projectile so formed as to have a cylindrical portion of uniform diameter of sufficient length only to carry the projectile steady through the bore of the arm or ordnance, and whose equilibrium or centre of gravity shall be at or near the forward part of such cylindrical portion. It consists also in providing the said projectile with a plug whose rear projecting end is conical, its forward end cylindrical, and its expansion frustrum portion intermediate or between such rear and front ends. It also consists in forming in the body of the projectile, forward of the frustrum recess, a cylindrical bore whose depth shall be greater than the length of the cylindrical portion of the plug.

A.D. 1873, January 11.—No. 127.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Andrew Gormly Myers, of the city and state of New York, United States of America.*)—“Improvements in stove and other pipes and in elbows or couplings for the same.”

The said invention has for its object the construction of joints in stove and other similar pipes and elbows. The said invention consists in making a flange around each piece of the pipe or elbow at the joint, the flange on one piece lapping over that on the other piece, so that by turning one piece of the pipe or elbow its flange moves in the lap of the other and the said piece can be turned completely round or any desired angle upon the other piece.

A.D. 1873, January 11.—No. 128.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws.—(*A communication from Charles Henry Perkins, of Providence, Rhode Island, United States of America.*)—"Improvements in machinery for rolling iron or other metal."

This invention relates, first, to means for reversing a bar of iron during its progress through the mill, so that the side which is the upper side when the bar is passing through one pair of rolls shall become the lower side when passing through the next pair in the series. I combine with the series of rolls a serpentine guide through which the bar is made to pass in its passage to the several sets of rollers, and by which it is presented to one side of the first pair of rolls and to the opposite side of the next pair, and so on through the series and reversed at each successive rolling. It also relates to constructing the cap of a twisting guide used in a series of rolling mills in sections, so that the same can be readily removed from or applied to the rolls without disturbing the housings of the rolls.

APPENDIX
TO
CHRONOLOGICAL AND DESCRIPTIVE INDEX,
CONTAINING THE

Abridgments open to public inspection before the expiration of the term of six months (in consequence of the Patentees having filed their Final Specifications), and also the Abridgments of Complete Specifications received from July 5 to 11, 1873. These Abridgments will be subsequently printed in the body of the book, in order to preserve the numerical and chronological arrangement.

A.D. 1873, January 13.—No. 129.

TURTON, WILLIAM, bus proprietor, and ROGERS, HORACE, coach builder, both of Leeds, in the county of York.—“Improvements in the construction of vehicles for conveying passengers and luggage.”

The vehicle carries inside the same number of passengers as a four wheel cab, it has one pair of wheels; driver is seated on roof and in front. The seats are one at back for two persons, one on the near, and one on the off side, to carry one person each. The entrances are at the sides in front of wheels, and the doors when open cover them. The sides are recessed and provided with arms. The top of vehicle is flat and provided with battens and movable fence for luggage.

The sashes of the windows work in grooves, the sliding parts being covered with caoutchouc; rollers are mounted in the grooves in the framework, revolving freely against the caoutchouc.

This arrangement of sash is applicable to other vehicles.

A.D. 1873, January 13.—No. 131.

COWPER, EDWARD ALFRED, of 6, Great George Street, Westminster, civil engineer.—“Improvements in machinery for sewing a sole onto a boot or shoe.”

This invention relates to improvements in machinery for sewing the soles onto boots and shoes, and consists in the use of a looper which places the thread in the hook of a hooked needle, such looper being arranged, so as to carry the thread in a circular or elliptical path round the needle, the looper being at the upper end of a lever, the lower end of which is actuated by cams or cranks so as to produce the requisite motion of the thread.

A.D. 1873, January 13.—No. 138.

SCOTT, WALTER, of Birmingham, in the county of Warwick, gun manufacturer, and MATTHEWS, WILLIAM JAMES, of Aston, near Birmingham, aforesaid, tool maker.—“Improvements in breech loading small arms.”

According to this invention the breech is opened and closed by a transverse silding block working horizontally in a shoe or breech chamber open at its top and rear. This block when pushed home to close the breech is fixed in that position by a spring or snap stud, and the said block is moved to open and close the breech by an arm or lever at its outer end.

The gun is discharged by a side external or central internal hammer acting upon a striker in the block.

The empty cartridge case is extracted and ejected by a cranked lever working in the top of the breech chamber and operated by the closing block, when the latter is withdrawn to open the breech.

A.D. 1873, January 14.—No. 155.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Donald Stuart and Alfred Henry Vandermeersch, both of Port Louis, in the Colony of Mauritius.*)—“Improvements in mechanism for breech action in breech-loading rifles and other descriptions of fire arms.”

This invention relates to improvements in breech loading rifles and smooth bores or fowling pieces, and comprises an improved form of stock, an improved stationary breech piece, and an improved sliding or

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(c)

moveable breech block, with which latter there are immediately connected the following pieces of mechanism, namely, a self-acting cartridge extractor, a self-cocking lock with striker, a trigger, a trigger guard with guard handle, a block wedge fitting the moveable breech block and corresponding chambers in the inner sides of the stationary breech, and, lastly, a lever handle for actuating the said block wedge.

A.D. 1873, January 15.—No. 161.

FULLER, THOMAS, of Longcroft, New Shoreham, in the county of Sussex, Doctor of Medicine.—“Certain new or improved apparatus to be used in fitting tops to billiard cues.”

This invention relates to apparatus for fitting tops to billiard cues and consists in an application of mechanical pressure in a direct line with the axis of the cue while the glue or cement used for retaining top on cue is soft, by which means a perfectly even joint between top and cue is ensured.

The apparatus may be made for operating upon a single cue or upon several cues at once.

A.D. 1873, January 18.—No. 208.

SCHWARZENBACH, VALENTIN, Professor of Chemistry at the University of Berne, Switzerland.—“An improved process of gilding on glass.”

Take a solution of pure gold, that is to say free from all other metals, effected by the ordinary chemical process.

When pure gold is employed the work is simple, since it is merely necessary to melt it in aqua regia or nitro-muriatic acid, and to evaporate it in the bain marie till it crystallizes; in all other cases the operation is more complicated on account of the manipulations necessary for separating the other metals, and it is generally requisite to precipitate the gold once by oxalic acid or by sulphate of iron, to bring it to the desired state of purity.

In all cases the crystallized mass of perchlorate of gold should be brought to boiling point with the water destined for its solution, as it invariably contains a considerable quantity of chlorid of gold insoluble in water, which slowly decomposes in a cold state, very gently in perchlorate or in metal, but which is instantly effected by coction.

After filtration the solution of gold is ready for use, its dephlegmation is regulated so that 200 cubic centimètres contain 1 grain of metallic gold.

This solution is then rendered alkaline by soda lye of mean strength, that is to say a sufficient quantity is added to it to turn red litmus paper blue; the addition of the soda should not cause any precipitate, and should never trouble the auriferous liquor; the quantity of soda must necessarily vary according to the dephlegmation of the solution. Before mixing the gold solution with the principal reactive destined to the reduction of the metal, it is indispensable to prepare the surface of the glass to be gilt with the greatest care, employing the same manipulations and materials used for cleaning photographic glasses, the reactive reductive is then prepared by saturating 30 per cent of spirits of wine with a current or mixture of marsh gas or olefiant gas; this operation completed, the spirits of wine is freed with its volume of distilled water.

The glass to be gilt is then disposed horizontally on another surface of glass, separated from it about the space of 3 millimètres, then 25 cubic centimètres of alcohol saturated with the gases is mixed with the auriferous solution, the liquid is then poured between the two glasses and then left to stand for 2 or 3 hours, at the expiration of which time the gilding is completed. The upper gilt plate is then removed carefully, washed, and varnished.

A.D. 1873, February 18.—No. 597.

SHAW, JOHN, of the Neptune Iron Works, Newcastle upon Tyne, engineer.—“Improvements in machinery and apparatus for punching and shearing.”

My invention consists in actuating the punch of a punching machine or the cutting tool of a shearing machine by means of steam or hydraulic power, the water under pressure from an accumulator or from the force pump or the steam being admitted to a cylinder in which is a piston; the rod of this piston is connected to the centre joint of two or four links forming a toggle joint. One end of the toggle joint is connected to a fixed centre, and the other end to the punching or shearing instrument.

A.D. 1873, July 5.—No. 2332.

YOUNG, CHARLES DENOON, engineer, in the city and county of Perth, Scotland.—(*A communication from John Ryle, junior, engineer, at present residing in Glasgow, Scotland.*)—“Improvements in ice boxes for the artificial production of solid and transparent ice.”

The improvement consists in using a box made of wood and divided into moulds by the use of hollow metal partitions and flat tubes. The blocks of ice are formed and frozen in these moulds. The refrigerating mixture is forced or circulated through the hollow partitions. The water in the moulds is agitated during the process of refrigeration by an arrangement of mechanism for permitting the air to escape liberated from it during the process of freezing.

A.D. 1873, July 5.—No. 2334.

ARMITAGE, THOMAS BURT, of the city, county, and state of New York, in the United States of America.—“Improvements in the process of disintegrating wood or woody fibre, and reducing the same to pulp.”

The object of this invention is to disintegrate and reduce chips or small portions of wood or woody fibre to pulp by subjecting such chips or small portions which have been saturated with alkaline solutions to a strictly non desiccative heat.

In carrying out this invention, wood or woody fibre which has been previously cut or otherwise formed into chips or small portions by any process and saturated with alkaline solutions is placed in a revolving cylinder, the axis of which is horizontal.

Whilst the cylinder containing the chips or small portions of wood or woody fibre is being revolved the mass of chips or small portions of wood or woody fibre therein contained is subjected to heat in the form of free steam.

According to one arrangement the steam is supplied to the revolving cylinder from a boiler or steam generator at one end at low pressure, whilst it is allowed to escape freely at the opposite end.

According to another arrangement the steam is supplied to the revolving cylinder at high pressure, and is retained a longer or shorter time within such cylinder as may be found necessary.

The steam supplied to the revolving cylinder may be superheated when required.

A.D. 1873, July 7.—No. 2342.

BONNEVILLE, HENRI ADRIEN, of the British and Foreign Patent Offices, 18 Rue de la Chaussée d'Antin, Paris, France, and 6, Piccadilly, in the county of Middlesex, patent agent.—(*A communication from John Orlando Johnson, a person resident in the city, county, and state of New York, United States of America, gentleman.*)—“Certain improvements in fluid meters.”

This fluid meter consists of a spiral blad mounted on a shaft revolving in the fluid supply pipe, and connected by suitable gear with a registering apparatus which indicates the number of gallons or cubit feet of fluid which pass through the said supply pipe.

A.D. 1873, July 8.—No. 2353.

HAZELTINE, GEORGE, of the “International Patent Office,” Southampton Buildings, London, Doctor of Laws.—(*A communication from James Davis and John Armstrong, both of Pittston, Pennsylvania, United States of America.*)—“An improved process of preparing hides and skins for tanning.”

The nature of the said invention consists in preparing hides and skins for tanning by immersing them in certain liquid compounds.

A.D. 1873, July 8.—No. 2354.

HAZELTINE, GEORGE, of the “International Patent Office,” Southampton Buildings, London, Doctor of Laws.—(*A communication from Winslow P. Eayrs and Timothy Edward Stewart, both of Boston, Massachusetts, United States of America.*)—“Improvements in rotary-engines.”

The nature of the said invention consists in the construction and arrangement of a rotary engine with a wheel provided with circumferential steam channels, abutments provided with packing and rollers, and a balanced valve. I also use packing rings made in sections and placed in grooves on the rotating wheel. The wheel is arranged in combination with sectional casings.

A.D. 1873, July 9.—No. 2377.

DUCOMET, JOSEPH, of No. 20, Rue des Petits Hotels, Paris, in the Republic France, civil engineer.—(*A communication from Auguste Bonamy, a person resident at Saint-Just-en-Chaussée (Oise), in the Republic of France.*)—“An improved machine for manufacturing nets.”

This invention consists in the construction of a machine for manufacturing nets. This machine differs from others in this, that mechanical means are here employed which allow of a continuous action with any kind of motive power. Instead of employing levers and treadles actuated by the workman mechanical means are employed which permit of automatically effecting the various operations.

A weft thread is employed and it is not necessary as in known machines to cut off the thread at each row, to knot it to form the selvage, to pass the bobbin thread over the needle which has to pass the thread through the meshes, or to take off the thread after it has passed through those meshes.

A.D. 1873, July 10.—No. 2389.

CURTIS, FREDERICK, of Boston, in the county of Suffolk, and state of Massachusetts, United States of America. —(*A communication from Charles Myrick Field, resident at Boston, in the county of Suffolk, and State of Massachusetts, United States of America.*)—"Improvements in machinery for cutting diamonds or other gems."

The improvements consist:—

1st. Of a primary bed plate made adjustable with respect to a tail stock or carriage holding the stone to be cut and bearing an adjustable tool carrier or stock, which is driven backward and forward on the main bed by suitable means,

2ndly. In the peculiar construction of the tool carrier, whereby a universal freedom of motion is obtained.

3rdly. In the peculiar construction of the tail stock or carriage, which holds the stone while being cut, to adapt the machine to cut gems of different sizes, or to adjust the position of the gem or cutting tool in order to obtain a universal variable motion of the gem or tool, so that any face may be cut upon said gem.

A.D. 1873, July 11.—No. 2393.

BUQUOY, XAVIER, merchant, of 19, Rue de Sevres, Paris, France.—"Improvements in dredging machines or vessels."

This invention relates to dredging machines or vessels removing sand, mud, and slime by means of suction.

The drawback to those in present use being the want of a proper mode of separating the substance to be dredged.

The features of novelty in this invention consist in the employment of a separator consisting of a number of picks arranged spirally on a shaft placed horizontally near the perforated suction pipe.

These picks are actuated by an endless chain passing over a toothed wheel or chain wheel governed by a transmitting shaft set in motion by a traction and pumping engine.

The picks are fixed on the shaft by a brittle pin, so that should they come in contact, the pin would break and not impede the progress of the apparatus.

The separator is constructed so as to allow the picks to reach beyond the lower part of the sucker from 5 to 6 centimetres, so as to set the substances to be dredged in motion, and raise it at the same time; at each end of the sucker a pick is placed, so that the dredgings are set in motion throughout the length of the sucker, and to prevent the latter being suspended at the extremities. A pick is also at each side of the chain wheel in the centre of the shaft, and prevents suspension at this part, and allows the sucker to always rest its whole length on the soil.

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AND TO

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Konn (*Lodighin*), 91.
Haseltine (*Smith*), 351 (*App.* 31.)
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Cederholm & Peterson, 1394 (*App.* 42.)
Fisk (*Bauer & Krieb*), 1534 (*App.* 44.)
Haseltine (*Pope & Sawyer*), 1641 (*App.* 45.)
- Elevators.** See "Hoists."
- Embroidering.** See "Sewing."
- Envelopes :**
Gordon, 10.
- Evaporating.** See "Heating."
- Excavating :**
Gay, 95.
Masourine, 207 (*App.* 30.)
- Excreta (treating).** See "Manure."
- Expressing moisture.** See "Drying."
- Extracting metals from their ores.** See "Metals (smelting)."
- F.**
- Fats.** See "Oils (animal)."
- Feed mechanism for machines.** See "Propelling."
- Feeding steam-boilers with water.** See "Steam-boilers (water-feeding)."
- Feeding troughs or bins for sheep, &c.** See "Troughs."
- Felted fabrics.** See "Fulling."
- Fertilisers.** See "Manure."
- Fettling or lining furnaces.** See "Furnaces."
- Fibres :**
Craven, 22.
Rydill, 82.
Curtis (*Gould*), 769 (*App.* 36.)
Fay (*Shedd*), 1101 (*App.* 39.)
Bonneville (*Martin*), 1148 (*App.* 39.)
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- Filtering ; purifying water :**
Bischof, 38.
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Finishing, dressing, singeing, shearing, folding and pressing woven fabrics, yarns, &c.:

Carmichael, 72.
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Fire-arms, guns and ordnance; gun carriages:

Stroudley & Drummond, 6.
Needham, 31.
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Johnson (*Stuart & Vandermeersch*), 155 (*App. 2.*)
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Haggott, 1461 (*App. 43.*)
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Fire-arms (charging, discharging and working):

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Fire-lighters. See "Fuel."

Fire-places; stoves:

Garon, 62.
Anyon, 69.
Whitwell, 86.
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Lake (*Myers*), 127.
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Fireproofing and rendering unflammable:

Lytle, 52.

Fire-screens:

Whitburn, 48.

Fire-works:

Bonneville (*Biennait*), 1348 (*App. 42.*)

Fishing nets:

Gilbee (*Procopé*), 564 (*App. 34.*)

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Flues and chimneys; cleaning chimneys:

Stroudley & Drummond, 6.
Imray (*Quinbel*), 309 (*App. 1.*)
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Flyers. See "Spindles."

Food for man (preserving and preparing). See "Preserving food."

Foot-paths. See "Roadmaking."

Forging metals. See "Metals (forging)."

Forks (corn and hay). See "Reaping."

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Fraud (prevention of):

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Fuel and fire lighters; saving fuel:

Boes, 34.
Anyon, 69.
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Smith (*De Chodzko*), 124.
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Heyworth & Wilkinson, 1890 (*App. 48.*)
Curtis (*Mills*), 1924 (*App. 48.*)
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Furnaces and cupolas:

Croll, 45.
Baynes, 78.
Rydill, 82.
Newton (*Goodrich, Hillman & Goodrich*), 90.
Stell, 111.
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Smith (*De Chodzko*), 124.
Stevens, 216 (*App. 30.*)
Haseltine (*McCarthy, Olds & Mason*), 681.
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Mickle, 921 (*App. 37.*)
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Haseltine (*Harding*), 2064 (*App. 50.*)
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Whittenbury & Whittenbury, jun., 21.
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Haseltine (*Waller & Fowler*), 77.
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G.

Galvanism. See "Electricity."

Galvanometers:

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Foulis, 59.
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Gauges; water level indicators:

Henry (*Dupuch*), 33.

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Curtis (*Field*), 2389 (*App. 2.*)

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Codd, 75.
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Granulating machines:

Morgan-Brown (*Hersey, Hersey & Gray*), 1233 (*App. 40.*)

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Thompson, 42.

Grinding, crushing and pulverising corn, grain, seeds, &c.; dressing flour:

Lake (*Eaton & Hall*), 26.

Grinding, crushing and pulverising ores, quartz, &c.:

Smith, 23.
Sholl, 525 (*App. 1.*)

Grinding and surfacing:

Haseltine (*Guernsey*), 1352 (*App. 42.*)

Guiding ships. See "Steering ships."

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Guns. See "Fire-arms."

H.

Hammers; hammering:

Hodson, 93.
Sholl, 525 (*App. 1.*)
Haggott, 1461 (*App. 43.*)

Hammers for marking or numbering timber, &c.:

Steinhoff (*Schmidt*), 88.

Harness and saddlery; cleaning horses:

Van den Bergh, 8.
Haseltine (*McClure, Graham & Cloughton*), 13.
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Croll, 45.
Garon, 62.
Baynes, 78.
Rydlill, 82.
Konn (*Lodighin*), 91.
Boynton & Holmes, 98.
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neaux), 1644 (*App. 45.*)
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"Spinning (carding)."

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ering heavy bodies:

Jaynor, 66.
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Gumpel, 9.

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Touaillon (*Comte de St. Ange*), 2184
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Horticulture; horticultural build-
ings; conservatories:

Lyttle, 52.
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Hydraulic motive-power. See
"Waterwheels."

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Henderson (*Demailly & Brun-*
neaux), 1644 (*App. 45.*)

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I.

Ice. See "Refrigerating."

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venting). See "Oxidation."

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plication):

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"Gauges."

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Haas, jun., 2231 (*App. 52.*)

Indicating pressure:

Bonneville (*Martin*), 486 (*App. 33.*)

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carriages and ships:

Cederholm & Peterson, 1394 (*App.*
42.)
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"Governors."

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of public carriages:

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ment of man."

Inks; inking; ink pads and
vessels:

Steinhoff (*Schmidt*), 88.
Gibson (*Andrews*), 119.
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J.

Jars (pickle):

Codd, 75.

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Lake (*Small*), 27.
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K.

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L.

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and shades:

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Rosa), 356 (*App. 31.*)
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Lavatories, wash-stands and ap-
pliances:

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Whitburn, 48.

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"Gauges."

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M.

Magazines or cartridge holders.
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Magma:

Thompson, 42.

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Steinhoff (*Schmidt*), 88.

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Meal. *See* "Grinding corn."

Measuring and indicating speed of ships; ships' logs :
Cederholm & Peterson, 1394 (*App.* 42.)

Measuring coal for charging retorts :
Rowland, 1287 (*App.* 41.)

Measuring distances on maps, drawings, &c. *See* "Chartometers."

Meat (preserving). *See* "Preserving food."

Medical treatment of animals :
Grigg, 786 (*App.* 36.)

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Chislett, 87.
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Metallic salts :
Haseltine (*Meylert*), 213 (*App.* 30.)
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Metals (boring). *See* "Boring."

Metals (casting and moulding) :
Stroudley & Drummond, 6.
Cooper, 16.
Hampton, 842 (*App.* 37.)
Haseltine (*Dougherty*), 932 (*App.* 37.)
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Haggett, 1461 (*App.* 43.)
Johnson (*Lobdell*), 2061 (*App.* 50.)
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Metals (coating). *See* "Coating metals."

Metals (cutting). *See* "Cutting metals."

Metals (forging, hammering, welding, bending and shaping) :
Sholl, 525 (*App.* 1.)
Michaud, 629 (*App.* 34.)
Haggett, 1461 (*App.* 43.)
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Metals (rolling) :
Kesterton, 53.
Kesterton, 54.
Law & Law, 71.
Roberts, 94.
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Haseltine (*Perkins*), 128.
Michaud, 629 (*App.* 34.)
Haggett, 1461 (*App.* 43.)

Metals (smelting, reducing and refining); treating ores; obtaining iron and steel :
Boundy, 17.
Newton (*Goodrich, Hillman & Goodrich*), 90.
Crispin, 122.
Stevens, 216 (*App.* 30.)
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Werdermann, 474 (*App.* 33.)
Mickle, 803 (*App.* 36.)
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Metals (soldering and brazing) :
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Meters for gas and fluids :
Decastro, 12.
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Bonneville (*Johnson*), 2342 (*App.* 2.)

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Mining, quarrying, getting coal and other minerals :
Gay, 95.
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Mirrors. *See* "Looking-glasses."

Motive-power (air and gas). *See* "Air-engines."

Motive-power from the rise and fall of tides :
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Motive-power (mechanical) :
Harrison & Conder, 32.

Motive-power (steam). *See* "Steam-engines."

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Motive-power (wind). *See* "Air-engines."

Moulding fuel :
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Whitburn, 48.
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Music (turning over leaves of) :
Soul (*Roturier*), 101.

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Musical instruments :
Newton (*Wolff*), 28.
Whitburn, 48.
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N.

Nail extractors :
Williams (*Copewell*), 64.

Names (illuminating street and other). *See* "Sign boards."

Needles :
Clark (*Broomhead*), 320 (*App.* 1.)

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Gilbee (*Procopé*), 564 (*App.* 34.)
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Webb, 728 (*App.* 46.)

Noxious gases and vapours (arresting and preventing) :
Haseltine (*Mc Cartty, Olds & Mason*), 681 (*App.* 35.)

Nuts and washers :
Haseltine (*Purdie*), 233 (*App.* 30.)
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O.

Oil-cake :
Bonneville (*Martin*), 486 (*App.* 33.)

Oil-cloths :
Clark (*Townsend*), 2190 (*App.* 52.)

Oiling or lubricating; materials for oiling :
Johnson (*Pearl & Battles*), 18.
Michaud, 629 (*App.* 34.)

Oil paints. *See* "Paints."

Oils (animal) :
Thompson, 42.
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Imray, 325 (*App.* 1.)
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Thompson, 42.
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Ordnance. *See* "Fire-arms."

Ores of metals (treating). *See* "Metals (smelting)."

Ornamenting surfaces and articles :
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Bremerkamp, 61.

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Boes, 34.
Konn (*Lodighin*), 91.
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Oxidation and incrustation (preventing and removing) :
Lee & Pringle, 594 (*App.* 34.)
Cutter (*Willis*), 1646 (*App.* 45.)
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Oxides :
Boundy, 17.

P.

Packing for engines, pumps, valves, &c. :
Sholl, 525 (*App.* 1.)
Haseltine (*Harwood & Newcomb*), 967 (*App.* 38.)
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Packing or making bales. *See* "Presses."

- Paddle wheels. See "Propelling ships."
- Paints; painting :
 Stephens, 35.
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 Haseltine (*Meylet*), 213 (*App.* 30.)
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- Paper, papier mâché, paper pulp (making) :
 Curtis (*Gould*), 769 (*App.* 36.)
 Armitage, 2334 (*App.* 2.)
- Paper (application of) :
 Haseltine (*Howlett & Onderdonk*), 1622 (*App.* 45.)
- Paper (cutting and ornamenting) :
 Leeming, Ray & Lynde, 46.
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- Paper ruling machines. See "Rulers."
- Parqueterie. See "Floors."
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- Peat :
 Boynton & Holmes, 98.
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- Pegs for boots and other articles made of leather :
 Winslow, 1619 (*App.* 38.)
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- Photograph frames :
 Whitburn, 48.
- Pickers for looms. See "Weaving (pickers)."
- Picture frames :
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- Piers :
 Masourine, 207 (*App.* 30.)
- Pile driving :
 Sholl, 525 (*App.* 1.)
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 Bonneville (*Warth*), 1572 (*App.* 44.)
- Pins :
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- Pipe wrenches. See "Wrenches."
- Pipes and tubes :
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 Boes, 84.
 Johnson (*Picq*), 43.
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 Smith (*De Chodzko*), 124.
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 Murray (*Quimbel*), 309 (*App.* 1.)
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- Pistons and piston packings :
 Lake (*Krauss*), 80.
 Sholl, 525 (*App.* 1.)
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- Planing. See "Cutting."
- Plants and trees (application of) :
 Bremerkamp, 61.
 Fay (*Shedd*), 1101 (*App.* 39.)
- Plates. See "Dishes."
- Ploughing, tilling and cultivating land :
 Walpole, 125.
 Lake (*Sprague*), 1770 (*App.* 1.)
- Polishing :
 Clark (*Broomhead*), 320 (*App.* 1.)
- Pontoons :
 McClean, 41.
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- Posts and poles :
 Kesterton, 54.
- Potash. See "Alkalies."
- Power indicators. See "Governors."
- Power looms. See "Weaving."
- Preserving and preparing articles of food :
 Scollay, 1815 (*App.* 47.)
- Preserving metals :
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- Presses, compressing and packing :
 Wilson (*Eickmeyer*), 76.
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 Bonneville (*Martin*), 486 (*App.* 33.)
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 Haggett, 1461 (*App.* 43.)
 Cutter (*Willis*), 1646 (*App.* 45.)
- Pressure of fluids (regulating the). See "Valves."
- Printers' type correcting tools :
 Shaw, 1298 (*App.* 41.)
- Printing oil-cloth :
 Clark (*Townsend*), 2190 (*App.* 52.)
- Printing paper; composing and distributing type :
 Whitburn, 48.
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- Printing papier mâché :
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- Printing wood and veneers :
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 Stroudley & Drummond, 6.
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- Projectiles. See "Shot."
- Propelling carriages; locomotion on land :
 Harrison & Conder, 32.
 Clark (*Avery*), 189 (*App.* 52.)
- Propelling machinery (feed mechanism) :
 Craven, 22.
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- Propelling machinery (gauges, guides and traversers) :
 Law & Law, 71.
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- Propelling or driving machinery; transmitting power and motion :
 Harrison & Conder, 32.
 Johnson (*Picq*), 43.
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- Propelling ships; locomotion on water :
 Hughes (*Van Loo-Wauters*), 63.
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- Pulleys and pulley blocks :
 Cooper, 16.
 Hartley, 81.
 Newton (*Goodrich, Hillman & Goodrich*), 90.
- Pulp for making paper. See "Paper."
- Pumps; raising and pumping water and other liquids :
 Haseltine (*Harwood & Newcomb*), 967 (*App.* 38.)
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- Punches for cutting out imperfect portions of veneer. See "Cutting wood."
- Punching metals. See "Boring."
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R.

- Rags and waste; rag engines :
 Rydill, 82.
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- Railway carriage burners (supplying gas to). See "Gas-burners."
- Railway carriages :
 Gardiner, 37.
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Railways (overhead) :

Leigh (*Bunster*), 15.

Railways (permanent way, rails, chairs and sleepers) :

Hughes (*Van Loo-Wauters*), 63.

Robinson, 67.

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Reaming :

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4. Index of Subject-matter to Chronological and Descriptive Index from January 1 to January 11, 1873, and to Appendixes from January 12 to July 11, 1873.

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CHRONOLOGICAL AND DESCRIPTIVE INDEX
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CONTAINING THE
ABRIDGMENTS OF PROVISIONAL AND COMPLETE SPECIFICATIONS

Delivered from January 12 to January 18, 1873.

A.D. 1873, January 13.—No. 129.

TURTON, WILLIAM, bus proprietor, and ROGERS, HORACE, coach builder, both of Leeds, in the county of York.—“Improvements in the construction of vehicles for conveying passengers and luggage.”

The vehicle carries inside the same number of passengers as a four wheel cab, it has one pair of wheels; driver is seated on roof and in front. The seats are one at back for two persons, one on the near, and one on the off side, to carry one person each. The entrances are at the sides in front of wheels, and the doors when open cover them. The sides are recessed and provided with arms. The top of vehicle is flat and provided with battens and movable fence for luggage.

The sashes of the windows work in grooves, the sliding parts being covered with caoutchouc; rollers are mounted in the grooves in the framework, revolving freely against the caoutchouc.

This arrangement of sash is applicable to other vehicles.

A.D. 1873, January 13.—No. 130.

LANIER, GUILLAUME PROSPER, of Paris, Boulevard de Strasbourg, No. 33, manufacturer.—(*A communication from Camille Gense, resident at Fouilloy sur Somme (France).*)—“An improved spring mattress.”

This invention relates to spring mattresses for bedsteads, sofas, and other articles, and consists in suspending in a frame any required number of longitudinal bars by sheet steel springs made in the forms of inverted crosiers, a spring being used at the ends of each bar.

The main frame of the mattress consists of two side frames formed of boards or plates kept together by two cross bars; and in pieces of wood or metal fixed to the side frames are tenoned other two cross-bars, to which one end of each spring is fixed, the other ends of the springs being connected by strips of leather or other flexible material to hooks screwed to the ends of the longitudinal bars, which bars are prevented from moving longitudinally by plates or rods held to the side frames.

A.D. 1873, January 13.—No. 131.

COWPER, EDWARD ALFRED, of 6, Great George Street, Westminster, civil engineer.—“Improvements in machinery for sewing a sole onto a boot or shoe.”

This invention relates to improvements in machinery for sewing the soles onto boots and shoes, and consists in the use of a looper which places the thread in the hook of a hooked needle, such looper being arranged, so as to carry the thread in a circular or elliptical path round the needle, the looper being at the upper end of a lever, the lower end of which is actuated by cams or cranks so as to produce the requisite motion of the thread.

A.D. 1873, January 13.—No. 132.

WHIPP, JOHN, of 86, Yorkshire Street, Rochdale, and MELLOR, WILLIAM WOOD, of Ash House, Bluepits, near Rochdale, both in the county of Lancaster.—“An improved instrument for cutting glass.”

Our invention consists in substituting for a diamond for cutting glass a revolving steel cutter which we mount in a stem or handle similar to an ordinary glazier's diamond.

A.D. 1873, January 13.—No. 133.

SMITH, WILLIAM BORTHWICK, and STARLEY, JAMES, both of St. Agnes Works, Coventry, in the county of Warwick.—“Improvements in sewing machinery.”

As a substitute for the brush usually employed in that class of sewing machines in which the spool for
[No. 3.] Price 4d. D

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A.D. 1873, January 13.—No. 134.

TRIPPE, FREDERICK JOHN, of Southampton, in the county of Southampton, woollen draper.—“An improved machine for cutting textile fabrics into small portions for patterns, samples, and other purposes.”

This machine consists of a horizontal table supported upon a stand, two rollers being placed beneath the former, and on which an endless band is arranged so as to work either forwards or backwards over the table. In connection with the table is a screw press in the foot of which is a slot, immediately beneath which is a similar slot in the bed or table of the machine. The fabric is laid upon the endless band and carried by it up to a regulating guage, and held by the pressure of the screw press. A suitable knife, having, by preference, a handle similar to that of a saw, is arranged to work by hand vertically through the slots, so as to cut the fabric as may be desired.

A.D. 1873, January 13.—No. 135.

NORMAN, JOHN, of Hoxton Square, in the county of Middlesex.—“Improvements in means or apparatus for clipping horses and other animals.”

The invention consists in mounting the moveable lever handle on an axis below the lower end of the moveable plate and in causing a projection from the moveable lever to work in a recess in the lower end of the moveable comb plate. The guide pins or studs are also placed in a line with the line of action of the projection, and over the moveable comb plate is fixed another plate with its upper end bearing upon the moveable comb plate to keep this plate firmly up to the lower comb and to hold the lever handle in position.

A.D. 1873, January 13.—No. 136.

HOLMAN, STEPHEN, of 10, Laurence Pountney Lane, in the city of London, engineer.—“Improvements in apparatus for raising and lowering heavy bodies, particularly applicable to the lids of gas purifiers.”

This invention consists of certain peculiar arrangements for lifting the lids of gas purifiers or other loads by means of elastic or of non compressible fluids, and consists according to one arrangement of a hollow ram through which the fluid is forced down into the cylinder from above; the lid or load to be lifted being connected to the ram. According to another arrangement no pumping is required as the lid or load is lifted by a load on the top of an inner ram working within an outer ram in a cylinder. On increasing this load the fluid pressure on the outer ram which carries the lid or load to be lifted is increased and a consequent lift is obtained.

A.D. 1873, January 13.—No. 137.

WATSON, ALBERT, of Andover, in the county of Hants.—“A combined thrashing machine and elevator.”

The invention consists in attaching the straw elevator to a thrashing machine thereby obviating the necessity for the use of a separate travelling carriage to the straw elevator.

A.D. 1873, January 13.—No. 138.

SCOTT, WALTER, of Birmingham, in the county of Warwick, gun manufacturer, and MATTHEWS, WILLIAM JAMES, of Aston, near Birmingham, aforesaid, tool maker.—“Improvements in breech loading small arms.”

According to this invention the breech is opened and closed by a transverse sliding block working horizontally in a shoe or breech chamber open at its top and rear. This block when pushed home to close the breech is fixed in that position by a spring or snap stud, and the said block is moved to open and close the breech by an arm or lever at its outer end.

The gun is discharged by a side external or central internal hammer acting upon a striker in the block.

The empty cartridge case is extracted and ejected by a cranked lever working in the top of the breech chamber and operated by the closing block, when the latter is withdrawn to open the breech.

A.D. 1873, January 13.—No. 139.

ASBURY, CHARLES, of Balsall Heath, in the county of Worcester, mechanical engineer.—“Improvements in tubular steam boilers and in furnaces for steam boilers.”

According to this invention a steam and water tight joint is made between the junction pieces or heads of the boiler tubes by means of a sphere of soft metal taking into hemi-spherical seats or recesses made in the opposed or abutting faces of the said heads, tubular channels in the soft metal spherical joints forming communications between the several tubes of the boiler.

According to another arrangement in place of heads on the open ends of the boiler tubes tubular junction pieces are fixed on the cylindrical surface or sides of the tubes, which tubes have closed ends. Each pair of side tubular junction pieces is drawn and fixed together by means of screw bolts having right and left handed threads on their ends taking into corresponding screw boxes inserted in lugs on the exterior of the junction pieces.

A soft metal spherical joint or an annular joint packed with asbestos is used at the opposed faces of the side tubular junction pieces.

The furnace is fed with coal or fuel by means of a hopper made of cast iron or fire clay, the said hopper passing through the furnace arch and projecting into the furnace. The walls of the hopper are provided with channels down which air passes and is heated, the heated air escaping to the furnace by external slits in the lower part of the hopper. The fuel from the hopper falls on to a rotating table having a slow intermittent motion and the fuel is removed from the table by a fixed scraper or otherwise.

A.D. 1873, January 13.—No. 140.

TONGUE, JOHN GARRETT, of the firm of Tongue and Birkbeck, patent agents, of 34, Southampton Buildings, Chancery Lane, in the county of Middlesex.—(*A communication from Pierre Auguste Léon Suzanne, merchant, of Paris, France.*)—“Improvements in imitation or composition slates, tablets, and other surfaces for writing, drawing, and marking upon.”

These improvements relate to the application of permanent lines, letters, figures, characters, or designs, to the surface of imitation or composition slates, “black-boards,” tablets, or other similar surfaces employed for writing, drawing, or marking upon, for the use of schools, instructive, or other like purposes, the prepared surfaces being suitable for receiving pencil or other marks, which can be readily removed by washing or rubbing out when required.

Thus on one or both of such prepared surfaces, and upon the whole or part of the said surfaces, tracings in paint, ink, or by other means, and of any color, are applied or produced thereon to indicate marks or models of writing, maps, designs, lines for writing music, or any other kind of marking or tracing, for any purpose that may be required, such outlines or markings produced upon the surfaces of the imitation slates, tablets, or prepared surfaces being permanent, so as not to be effaced by washing or rubbing.

A.D. 1873, January 14.—No. 141.

QUELCH, WILLIAM BEWICK, of Wigston Magna, in the county of Leicester, civil engineer.—“An improved method of and apparatus for heating and ventilating rooms and buildings.”

Beneath, above, and at the sides and back of the fire-grate or stove an air chamber or chambers is or are arranged so as to allow of the smoke passing up into the chimney by means of pipes or tubes running vertically through the chamber, or the tubes themselves may form the chamber or chambers, in which case they are placed horizontally. Air is admitted into the chamber or chambers by means of a perforated pipe or pipes communicating with the external air, and after having been sufficiently heated, rises into another chamber which is placed above the grate and is in communication with the air chamber, and thence through suitable pipes or apertures into the room or building to be heated. The grate is constructed with two sets of fire bars, the upper set being fixed, and the lower set moveable for the purpose of regulating the draught through the grate.

A.D. 1873, January 14.—No. 142.

HUNT, SAMUEL, of Wortley, Leeds, in the county of York.—“An improved building block.”

This invention consists in forming polygonal shaped blocks with projections and recesses upon and on four sides thereof, and one or more perforations through each block, each of which have indents in the ends to receive dowels. The blocks are made of the following materials; clay, concrete, cement, iron dross, plaster, asphalte, artificial stone, or a mixture of portions of such materials. In conjunction with such

blocks the inventor employs screwed rods and nuts for clamping the blocks together; and cast or wrought iron mouldings or bars may be placed in the recesses of the blocks, or embedded in a number of such blocks for constructing fire proof buildings, walls, girders, floors, beams, joists, columns, arches, self supporting partitions, landings, and for ventilating and warming rooms.

A.D. 1873, January 14.—No. 143.

ALLENBY, WALDEGRAVE, of the city and county of Chester, agent.—“Improvements in or applicable to “harmoniums.”

The invention consists in making harmoniums with two “wind chests” or in applying a smaller wind chest in addition to the ordinary wind chest.

This second wind chest is arranged so that by moving a stop in one direction, the wind is prevented from entering the large or ordinary wind chest, and is allowed to pass into the smaller wind chest, and vice versa by moving the stop in the contrary direction.

The object of the invention is to give “expression” or “swell.”

A.D. 1873, January 14.—No. 144.

PARLOUR, JOSEPH THOMAS, of Rutland Street, Pimlico, in the county of Middlesex, civil engineer.—“Improvements in wheels and in bearings for the same, chiefly designed for omnibuses, cabs, waggons, “and other similar vehicles.”

The said invention consists partly in the construction of the fellyes and the method of securing the same to the spokes, but it consists chiefly in the peculiar construction and arrangement of rollers and contrivances in combination with the same within the nave or hub for diminishing the friction.

A.D. 1873, January 14.—No. 145.

BENTLEY, GEORGE WILLIAM, and GARTH, RALPH FREDERICK, of London, in the county of Middlesex, merchants.—“Improvements in and in apparatus for treating hides, skins, wool, hair, cotton waste, “and seeds.”

Extraction of fatty matter from hides and skins; cleansing and preserving same by means of apparatus and the use of chloride of calcium and carbon-bisulphide under pressure. Removal of hair by means of hydrothianic acid. Extraction of oil from wool, hair, and cotton waste; scouring and bleaching same by means of chloride of calcium and carbon-bisulphide under pressure; also of hot air under pressure, and air and boiling water and agitation. Extraction of oil from seeds by the process lastly described excepting boiling water not used; using shallow digesting chambers and agitators.

A.D. 1873, January 14.—No. 146.

PITCHER, WALTER, of 15, Park Street, Camden Town, in the parish of St. Pancras, in the county of Middlesex, ornamental hair manufacturer.—“Improvements in craping hair and other fibrous materials, and “in the machinery employed therein.”

The use of hollow spindles to receive the cords which form the cores on which the hair or other fibrous materials to be craped are wound. The winding of the materials to be craped on a bobbin in a continuous strand. The tension motions by which the required closeness is given on the cores to the materials to be craped.

A.D. 1873, January 14.—No. 147.

SALMON, PETER, engineer, of No. 5, Mabledon Place, Burton Crescent, London, W.C., in the county of Middlesex.—“Improvements in steam boilers and oil gas apparatuses, and in oil gas engines and boilers, “and in the apparatuses connected therewith, partly to warm, ventilate, and light railway carriages and other “vehicles.”

First division. Steam boilers and gas apparatuses.

1st. The forcing of a requisite quantity of air into steam boiler, superheater, or gas generator, to assist the combustion of the gas. Also the option of oil direct to boiler.

2nd. The conjunction of the two parts, scrubbers and driers, into one part, and change of position.

3d. The application of this gas to fire grates, stoves, smelting iron stone, and other purposes.

Second division. Oil gas engines & boilers, and appars. cond. thereh.

1st. The forcing of a requisite quantity of air into steam boiler, superheater, or gas generator, to assist the combustion of the exhaust gas, and improved bell crank valve to regulate combustion.

2nd. Reciprocating axle to prevent friction in engines and vehicles, and applying leather on edge to tyres of driving tramway wheels.

3d. Dividing oil gas engines into two in vehicles, to give a free passage through them, and placing engines vertically.

4th. The application of gas improvers fitted on the exhaust gas pipes in the chambers of boilers, and starting tubes with fillers.

5th. The option of forcing direct into the steam boilers of these oil gas engines the requisite quantity of oil and air, and thus dispensing with the gas generator and superheater.

6th. The use of these improved gas engines and boilers at fixed stations on the line of route of railways, tramways, or common roads, to supply receivers in vehicles, to actuate power engines by air or steam.

7th. Improved unions and apparatus for warming, ventilating, and lighting railway carriages and other vehicles.

A.D. 1873, January 14.—No. 148.

SUTCLIFFE, WHITE LEY, of Dewsbury, in the county of York, grocer, and CLAYTON, GEORGE, of the same place, brass finisher.—“Improvements in miners’ safety lamps.”

The object of this invention is to prevent the removal of the gauze cover from miners’ lamps without instantly extinguishing the flame, and consists of an extinguisher of suitable size and form, which slides upon two upright stands fixed to the oil receptacle, and is suspended clear of the flame by means of a catch lever hinged to one of the uprights; this catch lever is connected with a jointed arm passing through a slot in the top part of the oil receptacle and at the bottom part of the gauze cover is a rack or ratchet.

In screwing on the cover the jointed arm gives way to the teeth of the ratchet, but on attempting to unscrew the cover the arm is actuated and operates on the lever, releasing the extinguisher which drops over the flame.

A lock pin is provided by which the cover can be fastened, which is then sealed to prevent tampering or attempting to unlock it.

A.D. 1873, January 14.—No. 149.

JENSEN, PETER, of 89, Chancery Lane, in the county of Middlesex, engineer and patent agent.—(*A communication from C. H. G. Olsen, of Christiania, in the Kingdom of Norway, engineer*).—“Improvements in automatic telegraphic printing apparatus.”

The first part refers to a perforating apparatus, which has a key board; when a key is touched a needle pierces a hole in a paper card on a cylinder. The second part refers to a printing apparatus having a type wheel with letters engraved on the edge corresponding to the keys. The paper covered cylinder coming from the perforating apparatus is placed in the printing apparatus between two points. As a needle falls into the perforations a current is sent, and the corresponding letter printed. A new kind of permanent magnet is also described.

A.D. 1873, January 14.—No. 150.

QUINTAVALLE, ROBERT, shipowner, and PRATT, WILLIAM THOMAS CASSELL, both of Newport, in the county of Monmouth.—“A new method of fixing a reserved rudder (in case of loss of the original one during a gale, or from any other cause) with very little delay.”

This relates to a skeleton kind of frame, which by special appliances becomes fitted in position over the stern of a vessel, to facilitate the steering from in-board.

A.D. 1873, January 14.—No. 151.

WOOD, RICHARD, of Almondbury, Huddersfield, in the county of York.—“Improvements in means or apparatus employed in weaving.”

For this purpose a “lay” is employed with shuttle boxes at each end thereof as usual, but between these ordinary shuttle boxes are mounted one or more extra shuttle boxes, which as required may be brought into position for receiving a shuttle from either end of the loom, and for a shuttle or shuttles to be picked across therefrom as desired whilst it may when required be taken out of position to allow a shuttle to be picked across the entire width of the fabric being woven.

A.D. 1873, January 14.—No. 152.

POWER, HAROLD LITLEDALE, of No. 40, Albemarle Street, Piccadilly, in the county of Middlesex.—“Improvements in umbrellas.”

This invention consists in the application to umbrellas of a locking bolt or catch in the upper end of the stick which can be turned by a key so as to lock the spring that holds the runner, and thus lock the umbrella in the closed position so as to prevent the umbrella from being used by any one but the owner.

The handle may be separate from the stick and be secured in a socket thereon, the key of the locking bolt being formed in the inner end of the handle; after locking the spring, the handle may be detached and retained by the owner.

Instead of locking the spring, the bolt or catch may be made to lock a sliding cap, such as is used for fitting over the ends of the ribs.

A.D. 1873, January 14.—No. 153.

PREECE, WILLIAM HENRY, of the town and county of Southampton, electrical engineer.—“Improvements in the mode of and apparatus for signalling on railways.”

The chief object of this invention is to work semaphore instruments with one line wire without rendering them liable to be affected by lightning contact or other disturbing electrical influences.

A.D. 1873, January 14.—No. 154.

SCOTT, HENRY YOUNG DARRACOTT, of Ealing, in the county of Middlesex, Major General, C.B.—“Improvements in the treatment of sewage, and of the deposits obtained therefrom.”

I precipitate the sewage water with quick lime in excess in tank No. 1. The precipitate thus produced is allowed to subside, and to the effluent therefrom I add soluble salts of cheap metallic oxides, such as the oxides of iron or zinc, in sufficient quantity to precipitate in tanks No. 2 the bases of such salts.

A.D. 1873, January 14.—No. 155.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Donald Stuart and Alfred Henry Vandermeersch, both of Port Louis, in the Colony of Mauritius.*)—“Improvements in mechanism for breech action in breech-loading rifles and other descriptions of fire arms.”

This invention relates to improvements in breech loading rifles and smooth bores or fowling pieces, and comprises an improved form of stock, an improved stationary breech piece, and an improved sliding or moveable breech block, with which latter there are immediately connected the following pieces of mechanism, namely, a self acting cartridge extractor, a self cocking lock with striker, a trigger, a trigger guard with guard handle, a block wedge fitting the moveable breech block and corresponding chambers in the inner sides of the stationary breech, and, lastly, a lever handle for actuating the said block wedge.

A.D. 1873, January 14.—No. 156.

CARRINGTON, WILLIAM THOMAS HENNEY, of 21, Gresham Street, London, in the county of Middlesex, and PLATT, JAMES, of Atlas Works, Gloucester, in the county of Gloucester.—“Improvements in the construction of domestic fire-grates to facilitate the economical burning of fuel therein.”

This relates to pivoting a circular or segmental cage within an ordinary shape of grate, also to providing a loose piece to the cage which is removable for the insertion of fresh fuel before the cage is turned round by a handle or lever. The bearings are fore and aft of the grate.

A.D. 1873, January 15.—No. 157.

DELESSERT, HENRI EDOUARD, of Rue Raynouard, No. 17, at Passy, Paris.—“An improved carriage.”

This invention relates to the construction and arrangement of a brougham or similar carriage with its door at the back and the seat over the hind axle, so that passengers sit with their backs to the driver, or there may be seats on either side. The body being mounted low, and its door being clear of the wheels, it is easily accessible from the road, and the passengers have an uninterrupted view backwards. Also the hind wheels are brought near the front wheels, whereby draught is lightened. The body is supported on a cross bar suspended from elliptic springs, which rest on the hind axle.

A.D. 1873, January 15.—No. 158.

LYTTLE, WILLIAM ALEXANDER, of the Grove, Hammersmith, in the county of Middlesex, engineer.—“Improvements in the permanent way of railways.”

The features of novelty are—

Firstly. The employment of a chair containing an intervening cushion of wood, asphalte, or other slightly elastic substance, between the chair and the bottom of the rail, to prevent the indentation of the latter.

Secondly. The employment of a chair to be so made that it can be set partly against the side and partly on the top of the sleeper, so as to allow the rail when in position to rest directly on the timber of the sleeper, or on one of the cushions mentioned above, for the same purpose.

Thirdly. The construction of the latter form of chair with a joint dividing it into two parts, so as to enable its jaws to be closed like pincers on the rail, and thus to dispense with wooden chair-keys for tightening the rail.

A.D. 1873, January 15.—No. 159.

FAWCETT, THOMAS, of Dewsbury, in the county of York, timber merchant, and COULTER, JAMES, of the same place, engineer and machinist.—“An improved governor for motive power engines.”

This invention relates to improvements in that class of governors for motive power engines for which Letters Patent dated the twenty first day of December 1871, and No. 3461, were granted to the aforesaid Thomas Fawcett and James Coulter, and consists of a spiral or other spring applied to the valve rod, by means whereof and an adjusting nut or screwed hand wheel the governor can be adjusted for the speed at which the engine is required to run. A finger or pointer applied near the adjusting nut or hand wheel indicates on a graduated scale the speed of the engine.

These improvements are specially designed for the governors of marine engines, but are applicable to governors of this class generally.

A.D. 1873, January 15.—No. 160.

OWEN, JAMES, of Great Lever, near Bolton, in the county of Lancaster.—“Improvements in machinery or apparatus for the prevention of accidents in ascending and descending shafts of mines, which improvements are also applicable to hoisting and other lifting machines.”

In my improved arrangement a wrought iron plate is fixed at or near the top of the cage.

This plate carries four studs, one on each side of each wooden guide. On each of these studs inside the plate is fixed a lever, and to the ends of these four levers are attached the four suspending rods to which the rope is connected. Outside the plate upon each stud is fixed a toothed lever or “dog,” so arranged that when there is any strain put upon the suspending rods, the inner levers before-named will hold the toothed levers or “dogs” away from the surface of the wooden guides, but as soon as the strain upon the suspending rods is withdrawn (as in the case of the rope breaking for instance) two springs acting against the inner levers (one against each pair) will force the said levers down and press the toothed levers or “dogs” against the surface of the wood guides, so that in the event of the rope breaking the cage will remain suspended.

A.D. 1873, January 15.—No. 161.

FULLER, THOMAS, of Longcroft, New Shoreham, in the county of Sussex, Doctor of Medicine.—“Certain new or improved apparatus to be used in fitting tops to billiard cues.”

This invention relates to apparatus for fitting tops to billiard cues and consists in an application of mechanical pressure in a direct line with the axis of the cue while the glue or cement used for retaining top on cue is soft, by which means a perfectly even joint between top and cue is ensured.

The apparatus may be made for operating upon a single cue or upon several cues at once.

A.D. 1873, January 15.—No. 162.

DAVIS, GEORGE, of Cranbourne Street, Leicester Square, in the county of Middlesex.—“Improvements in ships’ davits for shipping and unshipping, and lowering and raising boats or anchors, and other analogous purposes.”

This invention relates particularly to an improved construction of ships’ davits, composed of a standard upon which pivots a lever, from the upper part of which is suspended the boat or other object to be shipped or unshipped. To suspend a boat, two of these davits are used, one to carry the head, and the other stern,

and each davit-lever may be connected by a horizontal bar at top, or at top and bottom, so as to work exactly together. Lifting the lower end of lever, or lower lever bar, carries the boat outside the ship, and lowering it brings the boat again inboard.

Hauling lines or tackle are applied to the levers, or to the lever bars, to raise and lower the boat into or from the water, and these lines may also, if desired, be used for raising and lowering the davit-levers.

A.D. 1873, January 15.—No. 163.

WOOLRIGHT, JOHN, of Liverpool, in the county of Lancaster.—“An improved window sash fastener.”

My invention for an improved window sash fastener consists of an adjustable stud, which is countersunk into the window frame and presses against the window sash, the pressure being applied by an adjusting screw. This screw revolves freely in a plate, which is screwed or otherwise attached to the window frame. The stud is made square, with the screw passing through its centre. The screw is fitted with a suitable thumb and finger piece, so that it can easily be turned and adjusted by hand.

A.D. 1873, January 15.—No. 164.

JARMAN, HENRY, of Poplar, in the county of Middlesex, pattern maker.—“A new or improved right and left hand mechanical movement, applicable for steering apparatus for ships and other vessels, and for other purposes.”

A screw in two halves, one half having right hand and the other half left hand thread; the nut for same has right and left hand diamond thread, and is arranged so as not to shift longitudinally.

By turning the nut one way or the other, the two half screws move backwards or forwards in opposite directions. The application for rudder steering gear is described.

A.D. 1873, January 15.—No. 165.

HIPKINS, EDWARD, of Kate's Hill, in the parish of Dudley, and county of Worcester, iron safe manufacturer.—“Improvements in iron safes.”

The safe is made wedge proof by the adoption of a frame of strong T iron round the inside of the safe, and which said frame is firmly screwed to a strong wrought iron band and then to the outer plates of the body, one angle of the T iron coming level with the front edge of the safe and the middle angle forming the front of the fire resisting chamber. There is also a strong band of wrought iron firmly rivetted to the outer corner of the T iron frame which forms a rebate, and there are strong cramps at each corner leaving a deep groove between them and the strong band and also a space of several inches between each of the cramps.

On the door are fixed two strong bands, the outer one of which falls into the grooves between the cramps and the strong band leaving a rebate which shuts on to the strong band, the inner one falling between the cramps and the lock-case, thus firmly rabbeting the safe to the door and rendering the insertion of a wedge impossible.

The lockcase is made of strong angle iron and the bolts (which are all round) shoot under the T iron frame.

A.D. 1873, January 15.—No. 166.

WATTLES, JOSEPH WARREN, of the state of Massachusetts, of the United States of America.—“Certain new and useful improvements in machinery for spinning.”

This Complete Specification describes a mechanism to effect the proper adjustment of a ring spinning machine or frame ring, with respect to its spindle, and also to enable the ring and its receiver to be held together, and in the supporting or ring rail by the pressure of a single screw inserted in the rail.

The invention consists—

First. In an eccentric circular shanked ring and an eccentric circular receiver therefor.

Second. In the ring receiver constructed not only with a shank to fit the rail socket and with a bore eccentric with the cylindrical outer surface of the shank, but also so made as to be capable of being sprung or contracted upon the shank of the ring by a screw inserted in the rail and employed to confine the receiver in the socket of the rail.

Third. In the combination and arrangement of a single clamp screw with the ring rail and with the clamping receiver and its ring.

Fourth. In a ring gauge or centralizer for application to or as used with the spindle, the ring and its receiver to indicate the concentricity of the ring and the spindle.

A.D. 1873, January 15.—No. 167.

BOTTOMLEY, WILLIAM, designer, and NAYLOR, MICHAEL, mechanic, both in the employment of Sir Titus Salt, Bart., Sons and Company, of Saltaire, near Bradford, in the county of York.—“Improvements in apparatus employed in weaving.”

The object of one part of the invention is to obtain increased variety in ornamental effects in “swivel weaving.”

The small or swivel shuttles are carried in boxes each having two or more chambers and being capable of rotation so that each box may be capable of receiving two or more of such shuttles capable of variable selection as to the shuttle for the time to act in producing changes in color or other effect, and the parts carrying these boxes are capable not only of being brought into position for the passage of the threads of these small shuttles through sheds open for them, and also of being taken out of the way when weaving the body or ground of the fabric, but also of endway motion across the width of the fabric, so as to obtain variations in the relative positions of the successive figures across the piece.

The parts are lifted and lowered out of and into position for action by tappet on the main or other shaft, or it may be by jacquard or pattern surface aided by locking apparatus to lock the parts in position. The endway motion for change of relative position is obtained in either direction by the jacquard or pattern surface acting on arms operating drivers or clawers and ratchet wheels with pinion and rack or such like means, the ratchet wheels having successive teeth and the jacquard or pattern surface acting in succession if desired for the necessary extent of traverse from the production of one figure to the next.

Jacquard or pattern surface acts to produce the desired partial rotation of the boxes for changes of shuttle, by teeth on those boxes being operated by the teeth of pinions on a shaft operated in the desired directions by drivers and ratchets actuated by such jacquard or pattern surface.

The traverse of the shuttles and parts acting therewith is effected by jacquard or pattern surface.

The ordinary tappet motion for operating the weft of the ground or body of the fabric is thrown out of action whilst the swivel shuttles are acting.

The lay board is also capable of a downward movement if required to make room for the shuttle boxes and parts connected with them.

Also the invention relates to means for effecting changes in the order of selection of shuttles when employing rotary shuttle boxes so as to facilitate the placing of any of the series of shuttle chambers in a line with the lay.

For this purpose each of the levers for causing the partial rotation of the boxes in either direction is provided with three or more catch rods, either of which, by the jacquard or pattern surface acting on small levers or such like means, is capable of being brought into position to be acted upon by knife edges projecting or formed at different distances apart on a lifting lever actuated by the tappet motion.

A.D. 1873, January 15.—No. 168.

TARGET, JOHN LEWIS FELIX, of Portsdown Road, in the county of Middlesex, civil engineer.—“Improvements in treating excreta and sewage matters, and in apparatus employed therein, parts of the apparatus being also applicable to the drying and charring of other matters.”

According to this Provisional Specification, the solid excreta are mixed with a nearly equal weight of charcoal, and about four per cent. of coal tar or bituminous substance. The mixture is made into blocks or bricks, which, after being dried, are burnt or charred in a muffle furnace. The vapours and volatile bodies given off from the bricks become ignited, and the products of combustion are conducted by a flue to heat the boilers of a still or other apparatus in which the urine is treated. This utilization, for treating the urine, of the heat given off during or previous to the conversion of the solid excreta into charcoal is an important feature of the invention. The charcoal produced by the burning of the mixture of solid excreta and other substances may be subsequently used as fuel or otherwise.

Improved drying houses, muffle furnaces, distilling apparatus, and other necessary parts are described.

A.D. 1873, January 15.—No. 169.

TURTON, THOMAS, of Liverpool, in the county of Lancaster, iron and steel manufacturer.—“Improvements in and connected with hydraulic propellers for navigable vessels.”

This relates to propulsion by currents of water taken into the ship and ejected therefrom by a submerged rotating wheel and has for its main objects to take the water into the ship and pass it through and away therefrom with minimum friction in the passages and on the wheel and without causing commotion amongst the particles of the water. For these purposes I,—

First. Make the admission aperture the full area of the diameter of the wheel.

Second. Fit vanes, free at their ends and on one side, on one or both sides of a disc.

Third. Make the containing case of the same depth as the vanes and disc.

Fourth. Make the wheel case of increasing size towards the discharge orifice, such size at the point of delivery being equal to the area of the circumference of the wheel and of the same shape as the extended periphery of such wheel.

Fifth. Make the discharge way, called flume, of the same shape as the extended periphery of the wheel.

Sixth. When the wheel is worked on a vertical or nearly vertical axis I pass the shaft through a well, provided with a movable bottom, and stuffing box to allow the wheel to be raised in the well.

A.D. 1873, January 15.—No. 170.

SCHOLEFIELD, RICHARD, of Leeds, in the county of York, engineer and machine maker.—“Improvements in brick-making machinery.”

This invention relates to Letters Patent granted to the said Richard Scholefield dated August 25th, 1868, No. 2636, and July 15th 1870, No. 2002, respectively, and the improvements consist in new combinations and arrangements of parts contained in the Patents referred to, so as to simplify such machines in their construction and use.

A.D. 1873, January 15.—No. 171.

BULLOCK, ALFRED, of Birmingham, in the county of Warwick, mill sawyer.—“Improvements in apparatus for preventing incrustation in steam boilers.”

This invention consists in applying to the interior of cylindrical and other boilers a series of revolving vanes or scrapers carried by disks fixed on a spindle or shaft, the vanes or scrapers being so connected with the disks that they are capable of moving by their weight towards or from the spindle or shaft, the vanes or scrapers when raised to the upper part of the boiler by the rotation of the spindle sliding towards the spindle and when brought to the lower part of the boiler again sliding outwards. The vanes or scrapers are thus made to scrape the bottom of the boiler by being carried around it, the vanes or scrapers being pressed against the bottom by their own weight so that they can accommodate themselves to any inequalities or any irregularity in the curve of the boiler. By the action of the vanes or scrapers the mud or sediment is prevented from forming an incrustation in the boiler, the mud or sediment being removed by suitable openings in the boiler.

A.D. 1873, January 16.—No. 172.

LARUE, JUST, civil engineer, of 13, Tottenham Street, Tottenham Court Road, London.—“A multibular block printing apparatus, also applicable to cylinder printing.”

Producing simultaneous polychromatic and other impressions by means of blocks consisting of aggregations of small tubes the open ends of which form the printing surfaces of the block. Suitably filling such an assemblage of tubes with the colours appropriate to the designs required. Placing such blocks between a suitable press. Injecting compressed air into the open opposite ends of such multitubular blocks in order to force the colours downwards or upwards, as may be required, through the tubes and on to the surfaces to be printed. Suitably arresting the progress of the colouring matters when the impression is formed by exhausting the air from the opposite ends of the tubes forming the block or blocks. Fitting such blocks on printing cylinders. Charging the tubes by means of a syringe with the requisite colouring matters. Preventing the running of the colours by suitably drying the materials when thus printed. In the case of thick porous fabrics injecting compressed air into the upper ends of the tubes and exhausting air from the bottom plate of the press. Forming a suitable syringe for charging the colouring matters into the tubes by the use of a graduated tube fitted with a piston which is pressed down by a spring and regulated by a hand trigger.

A.D. 1873, January 16.—No. 173.

PARKER-RHODES, CHARLES ELMES, of 27, Somerleyton Road, Brixton, in the county of Surrey, Esquire, late of H.M. Consular Service.—“An improved mode and means for illuminating clocks and other similar articles.”

To render, by means of artificial light produced by the use of oil, spirits, gas, or liquid, or matter of any kind, glass or other transparent material of any kind coloured or non-coloured, wood coloured or non-coloured, metal coloured or non-coloured, that the time, any name, sign, and all other signs and things publicly exhibited be distinctly visible at a long range or distance.

A.D. 1873, January 16.—No. 174.

BONNEVILLE, HENRI ADRIEN, of the British and Foreign Patent Offices, 18, Rue de la Chaussée d'Antin, Paris, France, and 6, Piccadilly, in the county of Middlesex, patent agent.—(*A communication from Celestin Martin, a person resident at Verviers, in the Kingdom of Belgium.*)—"Certain new and useful improvements in machines for spinning wool, cotton, silk, and fibrous materials in general."

This invention consists in applying improved apparatuses to spinning machines for the purpose of preventing the too much instantaneous twisting of the thread up to the point of contact of the feeding cylinders which would prevent the regular drawing out of the thread.

A.D. 1873, January 16.—No. 175.

WRIGHT, JAMES, of No. 156, Gresham House, city of London, civil engineer.—(*A communication from Eugène Adolphe Aublet and Jean Gustave Baudot, of 141, Rue Pelleport, Paris.*)—"Improvements in the manufacture of heels for boots and shoes."

My invention consists in the use and application of paper or any substance composed of paper as a basis, from which material I manufacture the said heels. I compress, mould, or shape the said material into the required form, the heel being then attached to the boot or shoe in the usual way.

A.D. 1873, January 16.—No. 176.

GLEN, GEORGE, of 24, Frederick Street, Edinburgh, in the county of Edinburgh.—"Improvements in tramway cars and other rolling stock for tramways or railways."

Cars or carriages are mounted on bogies one at each end of the car and connected together by a jointed diagonal rod, so that the motion of one bogie on its axis will cause the wheels at one end of the axles of the two bogies to approach each other and those at the other end to recede, thereby bringing the axles into radial lines converging to the centre of the curve on which the car or carriage is running.

A.D. 1873, January 16.—No. 177.

HUGALL, CHARLES EDWARD, of Kensington, in the county of Middlesex, artist.—"Improvements in the mode of opening, closing, and fastening windows, and in apparatus therefor."

Application of a windlass to sash lines, also separate fasteners to the top and bottom sash rails, instead of joint fastener to meeting rails.

A.D. 1873, January 16.—No. 178.

HINDLEY, GEORGE, of Eccles, in the county of Lancaster.—"Improvements in machinery or apparatus to be employed for dressing stone."

This invention consists principally of a strong metal plate or disc fixed to the lower end of a vertical revolving axle, which latter is driven by toothed gearing or by a band and pulley.

This disc is provided with a suitable number of slots, in each of which is mounted a disc shaped cutter of hardened steel. These cutters are formed with a chisel edge all round and are fixed on short studs or axles mounted radially in the slots and are provided with set screws or other similar contrivances to prevent them from revolving on their axes and at the same time to allow of their being turned slightly on their axes, when one part has become dulled or worn, so as to present a fresh cutting surface to the work.

A.D. 1873, January 16.—No. 179.

BARNETT, JOHN, of No. 9, Basnett Grove, Wandsworth Road, in the county of Surrey, engineer.—"Improvements in machinery for obtaining motive power."

My invention is for working machinery for the traction of carriages, for propelling boats, and for driving machinery where a rotary motion is required.

The nature of my invention is the application of coiled springs placed together multiplied and worked in the following manner:—

I attach a coiled spring on each side of a circular disc having cogs on its periphery and worked on an axle in the centre, and when I require an accumulated power I collect several of them together. These pairs of springs I wind up separately by an endless screw formed on a shaft, at the end of which is a cranked handle. Two or more of these double springs I place side by side and fit them in a frame and turn them upon a common axle, and when greater power is required I multiply these frames and work them together. The

machinery is driven or reversed by a shifting shaft and pinion wheels worked from side to side, to put them in or out of gear, and proper breaks are applied to flanges formed on the outer wheels and to the driving wheels, when the machinery is required to be stopped or reversed.

A.D. 1873, January 16.—No. 180.

PLESSNER, JOHANN MAXIMILIAN, of Berlin, in the Kingdom of Prussia, at present residing at 11, Golden Square, in the county of Middlesex, late Captain in the Prussian army.—“Improved means or arrangements for filling or feeding lamps with liquid fuel, applicable also to the filling or feeding of other apparatus used for burning such fuel.”

This invention comprises a can or receptacle for the paraffin or oil or liquid fuel, provided with injecting mechanism or other means whereby through the agency of a tube the paraffin or oil or fuel can be introduced into the body of the lamp (by a suitable opening therein) without interference with the wick or allowing the paraffin or oil or liquid fuel to be exposed to the action of the air.

A.D. 1873, January 16.—No. 181.

HOPKINSON, JOSEPH TIMOTHY, of 110, Newington Causeway, in the county of Surrey, tool maker.—“Improvements in the means or apparatus for securing window sashes.”

The object of this invention is to prevent sash fasteners being opened from the outside of the window.

The Provisional Specification describes arrangements in which a plate is made to slide horizontally when the arm is pulled round to secure the window, the said plate then covering the opening between the sashes. Also the use of a spring on the front plate acted on by the arm, and carrying a guard similar to that described in a former Provisional Specification, No. 3339, 1872. Also a tilting guard acted on by the arm, so as to tilt over and protect the top and left side of the arm. Also means whereby the arm when moved forward to secure the sashes is kept behind a catch, but can at the same time be readily released when the arm is to be moved back from the inside. Also making the stop or side plate, the top plate, and the bottom plate of the front half of the fastener come quite up to the back edge of the inner sash. Also protecting the arm, &c., by a vertical curved piece on the front half. Also protecting the ordinary spring, &c., by making the upper plate of the back half cover the whole space up to the front half, except so much as is necessary for the knob of the arm and by enclosing the ends of the back half. Also protecting the ordinary spring by a vertical plate or a screw. Also protecting the knob of the handle from strings passed through holes in the sash by means of projections on the top plate. Also tapering the knob so as to cause any string which may be passed over it to slip down to the lower part. Also protecting the knob on its left side from any instrument by a guard. Also elongating the bottom plates of the front and back halves of the fastener, to prevent holes being bored through the sashes; also using separate plates for the same purpose.

A.D. 1873, January 16.—No. 182.

WIER MARSHALL ARTHUR, of No. 9, Great Winchester Street, in the city of London.—“Improvements in apparatus for registering and checking the entries and exits of passengers to and from tramway cars, omnibuses, or other carriages.”

This invention more especially relates to automatic apparatus for effecting an accurate check upon the amount of fares paid to the conductor by indicating the numbers of entries and exits to & from the above vehicles; but also relates to apparatus not entirely self acting.

Where convenient two ordinary turnstiles check the entries and the exits, or one may be made to answer both purposes. Where the space is too contracted for such an arrangement a folding turnstile, whose arms are actuated by means of cam surfaces, or a double gate arrangement may be used, either being so arranged that two passengers cannot pass at once.

The turnstile apparatus is in either case connected with and operates the registering mechanism by pneumatic or other means, such registering mechanism consisting of a suitable combination of dial face and counting apparatuses so arranged as to indicate the numbers of passengers entering or leaving the vehicle at or between the several stations. Sometimes dial faces with revolving indices are employed as registering media to effect the same object. Either alone or in combination with either of the above plans, a pricker or pencil acting upon a moveable paper is employed.

To secure the necessary changes in the registering mechanism, in order to place it in accord with the various stations on the route, a governing apparatus is moved by a projection from the tramway rail as the car passes over it, or the same effect may be produced by worm wheels on some rotating part of the vehicle,

connected by suitable means with the governing apparatus in the registering mechanism; or in other cases a species of clock work is arranged for the same purpose.

A modification of the clock work arrangement enables an account to be kept of the number of times the conductor himself enters the vehicle to collect fares or for other business.

A.D. 1873, January 16.—No. 183.

SCOTT, HENRY YOUNG DARRACOTT, of Ealing, in the county of Middlesex, Major General, C.B.—“Improvements in the purification of coal gas.”

The object of this invention is the removal of sulphur from coal gas by means of oxide of iron heated to redness in a suitable chamber.

A.D. 1873, January 16.—No. 184.

MACNEILL, ROBERT, of Lombard Street, in the city of London, late Captain 13th Hussars.—“An improved pavement.”

My said invention relates to a pavement which has a foundation of asphalt or other bituminous or tarry substance or compound and an upper structure or surface of blocks of wood or other suitable material.

A.D. 1873, January 16.—No. 185.

COUBRO, THOMAS POTTER, of Fenchurch Street, in the city of London.—“Improvements in the mode of cutting and making up sails of the character of jib and stay sails.”

For this purpose the seams of the cloth are formed to run parallel to two radial lines drawn from the clew, the seams on one side of the clew therefore running at an angle to those on the other side thereof whilst one or more of the cloths overlap each other at the clew. The cloths are placed at such angles that none of them will run parallel with any side of the sail.

A.D. 1873, January 16.—No. 186.

LACON, WILLIAM STIRLING, of the Union Club, in the county of Middlesex.—“Improvements in apparatus for lowering ships' boats.”

According to this Provisional Specification boats are suspended from the davits by two ropes or chains attached to them near their bow and stern ends; the ropes or chains are led under and over three or more sheaves at the outer end of the davits and from there are led over and wound around a roller. To the centre of this roller is attached a rope which as the boat is being lowered will be wound up on to the roller as the chains or ropes from the boat are unwound from it. And the lowering of the boat is controlled by a man paying out this rope.

A.D. 1873, January 16.—No. 187.

HAMILTON, EDWARD CHARLES, of Colchester, in the county of Essex, PRESTON, WILLIAM RICHARD, of Harold Court, Romford, in the county of Essex, and JONES, HENRY, of Colchester aforesaid.—“Improvements in the manufacture of artificial manure.”

According to this Provisional Specification sewage is mixed with or filtered through waste wool, wool dust, or shoddy; the materials are brought to a pulverulent form.

A.D. 1873, January 16.—No. 188.

HORNER, GEORGE, of Belfast, in the county of Antrim, Ireland.—“Improvements in machinery for hackling flax and other fibrous materials.”

The first improvement relates to an oscillating brush or brushes which dab the points of the hackle pins to prevent gum accumulating thereon.

The second improvement consists in rendering the rocking lever available for bringing down the tow catchers.

The third improvement relates to a cam cast on the one which lifts the holder troughs, operating a crank lever or levers for moving the hackles from one gradation to the other.

Also to a mode of rearranging the lifting of the holder troughs so as to get a higher or lower lift.

The fourth improvement provides for an extra quantity of flax or other fibrous material being placed in the holder without any danger of its getting set fast in the channels.

The fifth part of the invention relates to a tow shaker, which keeps the tow almost perfectly clean.

The sixth part relates to a device for breaking off the ragged ends of the flax during the upward motion of the holder troughs, instead of by hand as hitherto.

A.D. 1873, January 16.—No. 189.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from George Avery, of Ottawa, in the county of Lussalle, and state of Illinois, United States of America.*)—"Improvements in velocipedes, applicable also for producing rotary motion in other machines."

The object of this invention is to construct a machine to be propelled by the weight and strength of the operator, such as a velocipede, or for rotating a shaft for driving light machinery, or for other purposes. It consists of toggle or knee-jointed bars or treadles, attached at one end to a cranked shaft and jointed at the other end to the frame of the machine, the power being thrown first on one treadle and then on the other near the knee-joints.

A.D. 1873, January 17.—No. 190.

LEE, ROBERT BRISTOW, and ROGERS, SIMON ALFRED, both of the Riband Pole Company, Manchester, in the county of Lancaster, manufacturers of metallic telegraph poles.—"Improvements in the manufacture of metal pillars, posts, masts, or poles for telegraphic and other purposes, and in machinery employed in such manufacture."

This invention relates to the posts formed of spiral bars, according to a former patent granted to the petitioners, and consists in employing a revolving mandril in connection with a travelling carriage, which is actuated in unison with the said mandril and guides or lays the bars in the required spiral form upon the said mandril.

A.D. 1873, January 17.—No. 191.

HENSON, HENRY HENSON, of Lawrence Pountney Lane, in the city of London, engineer.—"Improvements in machinery or apparatus for shaping and punching strip or sheet iron."

This invention consists in corrugating or stamping, punching the rivet holes, and cutting or shaping the ends of strips of sheet iron suitable for forming fences such as are described in the Specification of the Patent No. 3075, 1870, at one operation and by one and the same machine, worked by hand, steam, or other power.

A.D. 1873, January 17.—No. 192.

ERSKINE, FRANCIS, of Salford, in the county of Lancaster, and DENBY, WILLIAM SAMUEL, of Heaton Norris, in the said county, ironfounders.—"An improved gully or stench trap for preventing the escape of noxious effluvia or gases from drains or sewers, and for preventing the ingress of solid matters into the same."

This invention consists of a peculiarly constructed chamber, into which fluid and solid matters pass through a grating; the solid matters are retained in the chamber, but the fluid passes through the sides to an outer casing, and thence to drain.

A.D. 1873, January 17.—No. 193.

PADDISON, HOWARD, of 57, Lincoln's Inn Fields, in the city of Westminster, in the county of Middlesex, gentleman.—"Improvements in the construction of sea walls, embankments, breakwaters, docks, piers, and other marine and river structures, and for the application of certain materials to those objects, which improvements and materials are also applicable to other useful purposes."

The method of constructing marine and other structures by means of flexible caissons, and the materials to be employed therefor.

A.D. 1873, January 17.—No. 194.

PERMAN, CHARLES HAYWARD, of Birmingham, in the county of Warwick, manufacturer, and WHITAKER, RICHARD, of Wolverhampton, in the county of Stafford, lock manufacturer.—"Improvements in metallic boxes and in the manufacture of the same, and in handles and fastenings for metallic boxes."

According to this invention an internal rebate is made on the edge of the box for the edge of the lid to shut down upon, the lid being strengthened by an internal wire at its edge. By these means a box is produced, the external sides of which are flush or are without the usual rib-like projections. The ends of the box and ends of the lid are made in one piece by stamping, the lid part being separated from the box part by being cut along the line of the top of the rebate. The body of the box is connected to the end parts by the ordinary closing processes. Semi-cylindrical projections or knuckles are stamped in the end pieces of

the box for jointing the handles to. The fastening consists of a rod or axis fixed to and constituting the axis of the link plate of the hasp of the lock and turning in bearings on the inner edge of the lid. The extreme ends of this rod or axis are bent at right angles, and when the lid is closed and the hasp has been turned down so as to engage it with the lock, the said bent ends of the rod or axis take into holes or slots in the rebate on the edge of the box, and thereby fix down or lock the lid at two points in addition to the ordinary lock. Or the fastening of the box is effected by two bolts forced outwards or drawn inwards by inclines carried by the hasp, the bolts engaging with or being withdrawn from staples on the box.

A.D. 1873, January 17.—No. 195.

UNSWORTH, THOMAS, of Manchester, in the county of Lancaster, machinist and doubler.—“Improvements in doubling machines.”

The novelty and advantage of this invention is that by placing a number of rows of wound bobbins of any number of ends on spindles and flyers on both sides of a machine, such passed through the eye of the spindle ends are twisted into cord thread or sewing cotton, and takes up by an equal number of bobbins each side and near the centre of the machine in tiers one row above another, and between each row works a range of friction rollers, one roller working between two taking up bobbins, one on each side of the machine, each taking up bobbin winding or taking up the finished work, doing thereby three times the work in one third the space and saving both power and labour.

A.D. 1873, January 17.—No. 196.

MILNER, EZRA, of Clayton, near Bradford, in the county of York.—“Improvements in lubricating the parts of steam and other engines.”

The invention relates to causing the steam, hot air, or gas as it passes to the cylinder to pass in contact with and take up grease, the effect of which will be to cause such steam, air, or gas in its progress to lubricate the parts of the engine with the grease it has absorbed.

A.D. 1873, January 17.—No. 197.

SEITZ, CARL DIETRICH JULIUS, of Edinburgh, North Britain, analytical chemist.—“An improved apparatus for and method of treating wood and other similar fibrous substances for the manufacture of half stuff and paper.”

This refers to an arrangement of a series of cooling pipes applied to the invention described in No. 3466, [3446] dated 19th November 1872.

A.D. 1873, January 17.—No. 198.

OSBORNE, DANIEL THOMAS, of Westoe, South Shields, in the county of Durham, engineer, and PALMER, RICARDO, of Lonsdale, Palmerston Road, Southgate, in the county of Middlesex, gentleman.—“A new self feeding air tight stove for heating greenhouses, rooms, and outhouses and other buildings.”

A stove having no outlet from it into the place to be heated, but is carried down below and air supplied from without and below the fire bars of the stove, and the products of combustion are carried off thro' the upper part of the place by a pipe or similar means. Also the means of regulating the combustion.

A.D. 1873, January 17.—No. 199.

SHANKS, JOHN, of Barrhead, in the county of Renfrew, North Britain, sanitary engineer.—“Improvements in water supply apparatus for jaw boxes or sinks, baths, wash-hand basins, open boilers, drinking fountains, and street or court wells.”

An important feature of the invention is the arranging of the primary outlet from the service pipe in the form of a float cock in a closed chamber. In the case of a jawbox or sink the closed chamber is formed as a contiguous compartment at one side, and a curved discharge spout or crane proceeds from the top or side of the compartment so as to overhang the jawbox. For discharging the water from the closed chamber there is fitted therein a water lifter, which comprises a fixed vertical cylinder, to which the discharge spout is attached. The lifting detail is a disc with a central opening, through which there passes a rod connected to a hand lever, the bottom of the rod having on it a small flange or disc, which lifts the main disc when the rod is raised. When the lifting disc is raised rapidly by the hand lever, the water above the disc in the cylinder is driven out of the discharge spout, and water enters the cylinder beneath the disc from the chamber, this water getting above the disc, through the central aperture, when the rod is pushed down. In the other applications the parts are slightly modified to suit each case.

A.D. 1873, January 17.—No. 200.

KIRKMAN, JESSE, of Chorley, in the county of Lancaster.—“Improvements in apparatus for governing “and regulating the speed of steam engines.”

This invention is applicable to that class of steam engines which are worked with valves which require to be raised by motive power, but fall by their own weight, whether aided by springs or otherwise. Hitherto such engines have been regulated by the action of a governor on an ordinary throttle valve, and hence when the load has been withdrawn, and the “racing” of the engine has closed the throttle valve to a considerable extent, the steam has become “wire drawn,” the area and lift of the valves being always constant. Now my invention consists principally of an arrangement of apparatus whereby I am enabled to keep the throttle valve always open (or to dispense with it altogether) and to regulate the admission of steam to the cylinder by giving more or less lift to the valve, such regulation of lift being effected by the action of the governor. By these means the steam does not become withdrawn, and the pressure of the steam in the cylinder is always equal to that in the boiler, whether the load is on or off the engine.

A.D. 1873, January 17.—No. 201.

PORTER, BENJAMIN, of Blackburn, in the county of Lancaster, machinery agent and mill furnisher.—“Improvements in pickers for weaving, and in apparatus connected therewith.”

This invention has for its object the construction of pickers of such form as to render available the smaller portions or “scrap” material or hide, and to ensure a steady movement of the pickers; and pickers of this construction may be reversed so as to render both faces available.

I employ for the outer portion or faces of the picker two rectangular strips of hide between which are other similar but shorter strips.

The centre or middle strip is somewhat wider than the body of the picker in which are elongated holes and buttons for securing the picking-strap to the picker. This centre or middle strip may be made of metal and an opening formed in the centre thereof, so that should the outer face of the picker be in time pierced by the shuttle tip the tip will not be damaged. Holes are formed in the upper and lower portions of the picker through each of which a picker spindle is passed so as to prevent lateral or unsteady motion of the picker.

A.D. 1873, January 17.—No. 202.

GEDGE, WILLIAM EDWARD, of No. 11, Wellington Street, Strand, in the county of Middlesex, patent agent.—(*A communication from Auguste Goueslain, of Cherbourg, France.*)—“A new or improved system of “obturator cock for liquids, gasses, and vapours, and an improved aerating faucet or vent peg of similar “construction.”

This invention consists in the use of an obturator or stopper fixed by a screw to the plug of the cock and surrounded by an india rubber washer. This obturator is raised and lowered to open or close the cock by a key which lifts and lowers the plug and obturator by means of a screw thread on the upper part of plug.

A.D. 1873, January 17.—No. 203.

CARDON-WAMAIN, JACQUES THEODORE, son, of Abbeville, department of the Somme, in the Republic of France, manufacturer.—“Improved machinery for bruising and rendering supple, breaking and stripping “hemp, flax, indian grass, and other textiles.”

The novelty of this machine consists particularly in the use of grooved plates rubbing against each other, and between which the flax, hemp, or other material is passed to be softened and its gummy matters removed. One of these grooved plates is carried on and actuated by a frame of special construction, itself operated by a particular arrangement of eccentric and toothed gearing.

A.D. 1873, January 17.—No. 204.

HORSLEY, THOMAS, junior, of York, in the county of York.—“Improvements in apparatus for closing “cartridge cases.”

In order to hold the cartridge case to prevent its revolving whilst it is being acted upon by the revolving tool, the lifting lever or plunger where the base of the cartridge rests upon it has a small lever applied to it, one arm of which comes under the base of the cartridge and is depressed by it at the time when the cartridge is held up to the revolving tool. When the small lever is thus turned on its axis it causes a clip to clip the lower part of the side of the cartridge case.

A.D. 1873, January 17.—No. 205.

WILLIAMS, MILES, of the Lion Oil Works, Wigan, in the county of Lancaster.—“Improvements in the manufacture of gas.”

This invention consists in forcing steam and oleaginous substances, more particularly hydro-carbon oils together, through an ordinary red hot fire clay or iron retort filled or partially filled with coke, charcoal, or other similar substances. The gas so generated may be used, either alone or mixed with ordinary common coal or cannel gas generated in the usual manner, the result being a better and more economically produced gas.

A.D. 1873, January 18.—No. 206.

MACNEILL, SIR JOHN, of the Grove, Boltons, South Kensington, in the county of Middlesex.—“Improvements in the construction of tramways and of vehicles to be employed thereon.”

My improvements are designed to render tramways or street railways more generally useful than they have hitherto been and to diminish the cost of conveyance thereon and make the carriages or vehicles more comfortable and convenient for the passengers and less objectionable to persons residing near them than has been heretofore practicable. The ground is levelled and covered with gravel: this foundation is covered with boards or planks. Upon these planks I place the longitudinal wood sleepers. The spaces between the sleepers and outside each of the sleepers to the width of eighteen inches is filled with similar wood blocks. Outside each outer row of blocks I place plates of iron or other suitable metal. Through the said plates and the sleepers and between the rows of blocks I pass strong iron tie-rods which have screw plates or nuts at each end. Between these long tie rods I use short rods passing through each sleeper to the outer plate. I construct my tramway to turn sharp or short curves. For this purpose I use curved rails and sleepers. Instead of making long carriages like those at present used I make each carriage of two or more separate portions or sections which may be used separately or coupled together. For connecting the carriages I prefer to use a contrivance which serves both as a coupling chain and buffer. The axles of each of these carriages or portions of carriages are made to turn on a centre pin.

A.D. 1873, January 18.—No. 207.

MASOURINE, MITROFANE SERGIEVITCH, civil engineer, of Moscow, in the Empire of Russia, now of Paris, France.—“An improved air chamber adapted to caissons used in the construction of the piers of bridges.”

The air chamber forming the subject of the present invention consists of a sheet iron cylinder attached to the top of the caisson by a circular jointure, the upper part of the chamber being above that of the caisson. This cylinder is divided into two compartments by means of sheet iron partitions; each compartment is provided with two lids or covers being upper and lower ones; in the case of one compartment the object is that when the lower lid is closed the upper one may be opened for the exit of the excavations, and for the descent of empty skips; whilst in the case of the other compartment, they serve for the passage of the workmen, and the descent of building material; this latter compartment is provided with an air conduit. The excavations when withdrawn are deposited in a rocking waggon which discharges them in any suitable position.

The cylinders or skips are united by sheets of iron, and move together round a vertical axis passing through bearings fixed to the partition of the compartments; the lower end of this shaft rests in a socket supported by a transverse piece bolted to the partitions of the caisson or to the interior counterforts. This shaft also bears the circular flat band on which, by means of rollers, the cylinders make a horizontal and circular movement for raising the excavations in the following manner:—

The lower lid of one of the compartments being closed, the men fill an empty skip and then raise it in the circular and horizontal manner described; outside the lid by means of a ratchet wheel they turn a nut at the top of the vertical axis, which being screw cut at the top, rises and locks the skip against the opening closed by the lid, which is then opened and the skip removed outside, by means of a rope and hook and hoist or windlass, and deposited in the waggon which transports it to the place of discharge, and the work is thus continued.

A.D. 1873, January 18.—No. 208.

SCHWARZENBACH, VALENTIN, Professor of Chemistry at the University of Berne, Switzerland.—“An improved process of gilding on glass.”

Take a solution of pure gold, that is to say free from all other metals, effected by the ordinary chemical process.

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When pure gold is employed the work is simple, since it is merely necessary to melt it in aqua regia or nitro-muriatic acid, and to evaporate it in the bain marie till it crystallizes; in all other cases the operation is more complicated on account of the manipulations necessary for separating the other metals, and it is generally requisite to precipitate the gold once by oxalic acid or by sulphate of iron, to bring it to the desired state of purity.

In all cases the crystallized mass of perchlorate of gold should be brought to boiling point with the water destined for its solution, as it invariably contains a considerable quantity of chlorid of gold insoluble in water, which slowly decomposes in a cold state, very gently in perchlorate or in metal, but which is instantly effected by coction.

After filtration the solution of gold is ready for use, its dephlegmation is regulated so that 200 cubic centimètres contain 1 grain of metallic gold.

This solution is then rendered alkaline by soda lye of mean strength, that is to say a sufficient quantity is added to it to turn red litmus paper blue; the addition of the soda should not cause any precipitate, and should never trouble the auriferous liquor; the quantity of soda must necessarily vary according to the dephlegmation of the solution. Before mixing the gold solution with the principal reactive destined to the reduction of the metal, it is indispensable to prepare the surface of the glass to be gilt with the greatest care, employing the same manipulations and materials used for cleaning photographic glasses; the reactive reductive is then prepared by saturating 30 per cent. of spirits of wine with a current or mixture of marsh gas or olefiant gas; this operation completed, the spirits of wine is freed with its volume of distilled water.

The glass to be gilt is then disposed horizontally on another surface of glass, separated from it about the space of 3 millimètres; then 25 cubic centimètres of alcohol saturated with the gases is mixed with the auriferous solution; the liquid is then poured between the two glasses and then left to stand for 2 or 3 hours, at the expiration of which time the gilding is completed. The upper gilt plate is then removed, carefully washed, and varnished.

A.D. 1873, January 18.—No. 209.

WEEKES, CHARLES, of Worcester, in the county of Worcester, civil engineer, and BARNARD, CHARLES, of Kenton Street, Brunswick Square, in the county of Middlesex.—“An new or improved arrangement in combining sticks or strips of wood for lighting fires.”

The novelty in this case, consists in so securing the sticks or strips of wood at one end thereof, that the several pieces, forming one bundle, may be opened to form a sort of cradle or trestle with the apex downward, and thus placed for use in the fire-grate.

A.D. 1873, January 18.—No. 210.

DAVIES, ROBERT VAUGHAN, of Old Street, Saint Luke's, in the county of Middlesex, zinc-worker.—“A new or an improved apparatus for preventing the waste of water used for water-closets and domestic purposes.”

The novelty in this case consists of the cylindrical shape and the material, zinc, of the water-chamber; its simplicity of construction; and in having self-acting valves which prevent more than a certain quantity of water being used at one time.

A.D. 1873, January 18.—No. 211.

ELMSLIE, EDMUND WALLACE, of 5, Great Winchester Street Buildings, in the city of London, gentleman.—“Improvements in the means of and apparatus for opening hermetically closed and other cases, boxes and cans for containing preserved articles of food or other goods.”

This invention relates to further improvements upon those described in the Specification of Letters Patent granted to me and dated the 7 March 1872, No. 704.

I now fix the wire so as to cause it to cut the metal, and is facilitated by means of a travelling roller lever which takes hold of one end of the wire, and by turning the same the whole or part of the lid or other part becomes opened.

A.D. 1873, January 18.—No. 212.

HENLEY, THOMAS FREDERICK, of St. George's Square, Pimlico, in the county of Middlesex, gentleman.—“Improvements in the manufacture of meat extract.”

The object of this invention is so to treat meat for obtaining meat extract as to utilize all the elements of its composition instead of (as in the Liebig process) utilizing only the soluble salts thereof.

A.D. 1873, January 18.—No. 213.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws.—(*A communication from Asa P. Meylert, of New Britain, Connecticut, United States of America.*)—"Improvements in the manufacture of white lead, and in the purification of carbonic acid gas used in the said manufacture, and in apparatus therefor."

My invention relates to an improved apparatus for manufacturing white lead, and also to improved methods of purifying the carbonic acid gas used in the said manufacture. I use an apparatus whereby the carbonic acid gas required for corroding the lead is used to assist in conveying the vapour of acetic acid into contact with the metallic lead, and is also used to assist in vaporizing the acetic acid required for corrosion. The method of manufacturing white lead by the said apparatus is as follows:—Thin strips or pieces of lead of any convenient size are placed in a suitable chamber or house. At any convenient distance from this chamber and connected thereto by a pipe or pipes, or within the chamber itself is placed a vessel, reservoir, or receptacle of any suitable form or shape containing acetic acid of any suitable strength; carbonic acid gas either pure or mixed with oxygen or with common air is forced through a suitable pipe or pipes into the said receptacle containing acetic acid, the gas being passed through or over the acid and then passed from the said receptacle freely into the room containing metallic lead for corrosion; steam is likewise introduced at any convenient point and mingled with the gas and vapour.

A.D. 1873, January 18.—No. 214.

COX, JOHN, of Newcastle on Tyne, in the county of Northumberland, analytical chemist, and COX, SAMUEL, of Hatcham Road, in the county of Surrey, hydraulic engineer.—"An improved process and apparatus for extracting and recovering oils, fats, and similar substances."

Our said invention relates to the extraction and recovery of oils, fats, spermaceti, paraffin, wax, and other like substances by the action of a volatile solvent passed by distillation through materials containing these oily, fatty, or other substances, the said volatile solvent being recovered after each operation.

A.D. 1873, January 18.—No. 215.

NICHOLS, JONAS, of St. Mary Street, Southampton, Hants, builder.—"Improved apparatus for ventilating water closets, a part of which improvements is applicable to other useful purposes."

This invention consists in fitting to the upper edge of the pan of water closets a trough shaped ring terminating in a tube, to which pipes are connected for conducting the noxious gases from the water closet into an adjacent chimney, flue, or direct into the external atmosphere. The lid or cover of the closet is provided with a valve, which when the lid is closed prevents all escape of the noxious gases into the apartment. A spring, catch, or fastening is employed for holding the lid firmly down to the seat, such fastening being also applicable to the securing of the lids of boxes, &c.

A.D. 1873, January 18.—No. 216.

STEVENS, LEVI, of Washington city, district of Columbia, but now sojourning in the city and county of San Francisco, California, in the United States of America.—"A process for forming carbonic oxide from oxy-hydrogen vapor or steam, and an apparatus for utilizing the same for heating purposes."

This invention consists in the discovery of the conditions by which carbonic oxide or protoxide of carbon is formed from oxy-hydrogen vapours or steam.

Also in distilling bituminous coal, asphaltum, pine wood, and in fact any substance that will distil a carbon or hydro-carbon vapour or gas, which vapour or gas is used in the disintegration of oxy-hydrogen vapour or steam.

The invention further consists in the application of carbonic acid or protoxide thus formed to steam boilers, furnaces, and all places where heat is required. This being affected by the use of any suitable number of retorts which are set so as to be heated by the same furnaces which serve for the steam boilers.

These retorts are charged with any suitable or convenient substance which will produce a carbon or hydro-carbon vapour by distillation and at the proper time. Superheated steam (from an apparatus also heated by the furnaces) is let in at a temperature at which the carbon is decomposed.

Protoxide of carbon and free hydrogen are thus evolved, and the gasses thus produced are led by suitable pipes into the furnaces.

Provision is also made for the introduction of oxygen from the air for the complete combustion of the gasses thus introduced.

A.D. 1873, January 18.—No. 217.

BACKUS, OSCAR JEROME, and SAWYER, ALBERT FRANKLIN, of San Francisco, California, and LORYEA, ABRAM MEYER, of East Portland, Oregon, in the United States of America.—“Improvements in the application of motive power to sewing machines, turning lathes, and other light machinery, also including improvements in the mechanical construction of water wheels suitable for this purpose.”

This invention consists in driving sewing machines, turning lathes, and other light machinery by means of a water wheel attached directly to the driving shaft of said machines, so that the two parts so combined will form one piece of machinery. Water for driving the wheel is supplied by permanent pipes or temporary tube connections, which conduct the water from the ordinary water pipes which are provided in most houses, or from an elevated source of supply according to circumstances. A valve is provided which is operated by a treadle, and by means of which the amount of water delivered upon the wheel is easily and readily regulated.

This invention also includes certain improvements in the mechanical construction of the water wheels to be used for this purpose, by which economy of construction, strength, and adaptability are combined.

A.D. 1873, January 18.—No. 218.

FARROW, CHARLES, of Great Tower Street, in the city of London, mechanical engineer.—“Improvements in stoppering bottles for aerated or gaseous liquids.”

This improved stopper is formed by attaching to the ordinary bottle a tube of flexible or elastic material, such as india rubber, or india rubber lined with linen, one end of this tube being passed over and attached to the neck of the bottle by string or wire.

To close the bottle the upper part of the tube may be either doubled down and tied, or strangled.

A.D. 1873, January 18.—No. 219.

WELLS, RUFUS GIBBON, of New York, United States of America, at present of 123, Chancery Lane, London, scientific lecturer.—“Improvements in apparatus to be used in connection with theatrical and scientific exhibitions; applicable also to other purposes.”

This Provisional Specification describes improved constructions of pneumatic discs, and their application in connection with other apparatus for purposes of utility and scientific amusement.

A.D. 1873, January 18.—No. 220.

HAWKINS, JOHN GREAVES, of the Gas Works, Sheffield, in the West Riding of Yorkshire.—“Improvements in apparatus used in the manufacture of gas.”

The object of this invention is to relieve the retorts from unnecessary pressure when in action by removing the seal in the hydraulic main, and so arranging the apparatus that when the retort is not actually employed in making gas, the dip pipe or its equivalent shall become automatically sealed. The invention consists in enlarging within the hydraulic the ordinary dip pipe and making an opening therein, which is covered by a plate capable of adjustment. The plate carries a short curved pipe which passes through it, one end entering the dip pipe and the other rising within the body of the hydraulic to a height somewhat greater than the corresponding part within the dip pipe.

The hydraulic being supplied with liquid to a height level with the top, or rather above the curved pipe in the dip pipe, the liquid will flow into and fill the curved pipe; but as soon as any gas is evolved in the retort the gas will, in its endeavour to escape into the hydraulic main, force the water out of the curved pipe, and maintain for itself a free passage. When the gas ceases to come over however either from the opening of the lid or otherwise, the liquid in the dip pipe will immediately flow into the curved pipe and effectually seal the gas way. Should the curved pipe become choked from any unforeseen cause, the gas will flow down the dip pipe and escape from its bottom edge in the ordinary manner.

A.D. 1873, January 18.—No. 221.

CODD, HIRAM, of Grove Lane, Camberwell, in the county of Surrey.—“Improvements in tramways.”

This Provisional Specification describes arranging the wheels of tramway cars to run in grooves or channels which open as the wheels come up, and again close after the wheels have passed, so as to leave an even surface over which the ordinary wheeled vehicles can run freely.

A.D. 1873, January 18.—No. 222.

DIXON, JOHN, of No. 1, Laurence Pountney Hill, in the city of London.—“Improvements in the construction of the piers of bridges and viaducts.”

This Provisional Specification describes forming piers of tubes made from plates of iron bent into a cylindrical form and rivetted together. The tubes are filled with concrete which maintains them in form and also aids in supporting the load placed upon them.

A.D. 1873, January 18.—No. 223.

REDGRAVE, JOHN, and WRIGHT, DANIEL, both of Birmingham, in the county of Warwick.—“Improvements in glass vessels and other articles to which taps, stoppers, and other attachments are to be applied.”

The object of these improvements is to form or leave holes or openings in glass vessels of various kinds or other hollow or partially hollow glass articles at the time they are moulded, and around such holes or openings, on the interior surface, enlargements are formed (or the thickness is increased) in order to afford sufficient surface for the insertion of taps, pipes, stoppers, plugs, or other attachments with or without washers, the mould being suitably formed for this purpose.

When required the holes or openings are formed with a screw thread to receive screw attachments.

Glass taps, pipes, or stoppers may likewise be formed in this manner.

A.D. 1873, January 18.—No. 224.

GEORGE, CHRISTOPHER, of Herne Hill, in the county of Surrey, Staff Commander R.N., and PORTER, HENRY, of the Strand, in the county of Middlesex, optician.—“An improvement in pediment or cistern barometers, and in the means of filling the same.”

The cistern is made open at bottom, so that when fitted on the mouth of the tube and the two inverted, the mercury may be poured into the tube without the use of a funnel, a twisted or spiral cord having been first introduced into the tube. This cord has a brush or feather at its extremity, which reaches the closed end of the tube, & the mercury on being poured in is broken up into globules, which pass down between the cord and the sides of the tube.

The cord is then rotated in the tube, which raises it out of the mercury, bringing with it all air bubbles. When the tube is filled the cistern is closed by a vulcanized india rubber stopper and the instrument brought to its proper position.

A.D. 1873, January 18.—No. 225.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings London.—(*A communication from Judson W. Warner, of Oneida, New York, United States of America.*)—“Improvements in fire-proof vaults.”

The object of this invention is to increase the safety of fire-proof vaults by lining the inside of the same, with independent metallic water compartments communicating with each other and also with a pipe; the latter supplies water from a tank or reservoir to the said compartments, and there is an exit pipe at the top or highest point, by which the water is permitted to escape.

A.D. 1873, January 18.—No. 226.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Judson W. Warner, of Oneida, New York, United States of America.*)—“Improvements in fire-proof safes.”

The object of this invention is to increase the fire resisting qualities of safes. I therefore construct the safe with spaces in the top, bottom, sides, and door of the same, through which is maintained a constant flow of water.

A.D. 1873, January 18.—No. 227.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Lyman Reed Blake, of Fort Wayne, Indiana, United States of America.*)—“Improvements in sewing machines for the manufacture of boots and shoes.”

[No. 3.]

This invention relates to the construction and organization of a machine for sewing what are known as "turned shoes." The said invention consists in the combination and arrangement of mechanism for imparting reciprocating movements to the needle-bar. In mechanism for imparting the movements to the cast-off relatively to the movements of the needle. In the arrangement of mechanism for throwing the needle-bar out of connection with its actuating mechanism. In the construction and arrangement of the intervening mechanism by which from the main driving shaft the respective vertical movements of the throat piece, needle bar, and channel foot are effected. In the construction and arrangement of the rocker sleeve and its arms, the bender bar, and spring for reciprocating the bender. In the arrangement of mechanism for actuating the thread-guide and the awl bar, and in the arrangement of mechanism for adjusting the position of the hook.

APPENDIX
TO
CHRONOLOGICAL AND DESCRIPTIVE INDEX,
CONTAINING THE

Abridgments open to public inspection before the expiration of the term of six months (in consequence of the Patentees having filed their Final Specifications), and also the Abridgments of Complete Specifications received from July 12 to July 18, 1873. These Abridgments will be subsequently printed in the body of the book, in order to preserve the numerical and chronological arrangement.

A.D. 1873, January 20.—No. 228.

BOWRA, MATTHIAS EDWARD, of Upper Norwood, in the county of Surrey, and WOOD, THOMAS, of Adelaide Road, in the county of Middlesex.—“Improvements in the manufacture of elastic fabrics.”

First. We prepare webbing or other cloth made of silk, wool, cotton, or other suitable material with a preparation of india rubber or other elastic gums to impart the necessary substance or strength.

Second. The webbing or cloth so prepared we then unite with sheets of india rubber or other elastic gums to impart the requisite solidity and elasticity.

Third. We perforate and ventilate the materials so arranged by rolls or by other suitable mechanical methods when desirable.

A.D. 1873, January 21.—No. 239.

WILSON, GEORGE, of Banner Cross, Sheffield, in the county of York.—“Improvements in bending “armour plates, and in apparatus for that purpose.”

This invention relates to the bending of armour plates, so that the convex surface is that which was uppermost in the furnace, being the most capable of resisting shot.

The plate to be bent is placed without inversion on a convex mould or on a truck, with a convex surface within a strong framing, and cross bars are forced down by wedges or screws, or a concave mould is forced down by hydraulic pressure, so as to bend the plate over the curved mould or truck, the uppermost surface of the plate being thus rendered convex.

A.D. 1873, January 21.—No. 247.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Jean Dedier Digney, Théodore Sebastien Digney, Henry Lartigue, and Henri Forest, all of Paris, in the Republic of France.*)—“Improvements in apparatus for transmitting signals and for opening “and closing cocks and valves, which improvements are specially applicable to the prevention of railway “accidents.”

This invention relates to a peculiar combination and arrangement of steam whistle and electro magnetic apparatus for transmitting signals, which arrangement is more particularly applicable to locomotive engines on railways for the purpose of warning the driver that any given signal is turned against him in cases where by reason of fogs, snow storms, or other causes a difficulty exists in seeing the signals along the line, and hence one of the causes of railway accidents, namely, running past a danger signal is obviated.

The said invention is also applicable to the transmission of signals from the bridge to the engine room on board steamers, also from the lower workings or galleries of mines to the surface, also to the opening and closing of cocks or valves for steam, air, or liquid at long distances in large works or manufactories.

A.D. 1873, January 21.—No. 248.

ROBERTSON, JOHN, of Nitshill, in the county of Renfrew, North Britain.—“Improvements in machinery “or apparatus for forcing, exhausting, or measuring air, gas, or other fluids or liquids.”

The feature of novelty which constitutes this invention consists in arranging on a shaft, or spindle at the interior of a cylinder, or casing, one or more rollers or discs, provided with slide valves. An opening is formed in the cylinder or casing at one side of the valve or valves, through which the air, gas, or other

[No. 3.—APP.]

(D)

fluid or liquid passes or is drawn thereinto, and the said air, gas, or other fluid or liquid is on the rollers or discs, being rotated by the shaft or spindle, forced out through another opening situate at the opposite side or sides of the slide valve or valves.

The apparatus may also be employed for measuring air, gas, water, or other fluid or liquid.

A.D. 1873, January 24.—No. 287.

BROTHERHOOD, PETER, of No. 15, Elgin Road, Nottingham, in the county of Middlesex.—“Improvements in applying steam power directly to centrifugal and other rapidly revolving machines, and apparatus therefor.”

This invention relates to means of applying steam power directly to centrifugal and other rapidly revolving machines without the necessity for multiplying gear.

Three steam cylinders are arranged with their axes intersecting at angles of 120° , so that their pistons act on one crank within a cavity containing steam which presses constantly on one side of each piston. The crank drives a rotary slide by which steam is successively admitted to, and allowed to escape from, each cylinder whereby continuous rotary motion at high speed is imparted to the crank shaft.

The crank shaft is coupled or attached to the revolving basket of a centrifugal machine, the driving apparatus being placed either under or above the centrifugal machine and arrangements are described for allowing for shake or eccentricity and relieving the weight of the rotating parts.

Similar apparatus is applied to driving other rapidly rotating machines, such as fans, circular saws, threshing machines, rotary pumps and propellers and the like, by extending the driving shaft so that its extension constitutes the shaft of the machine to be driven or by connecting the two shafts by any known coupling.

A.D. 1873, January 28.—No. 338.

OLLEY, GEORGE, of Diss, in the county of Norfolk, engineer, and JACKSON, WILLIAM, of the same place, engineer.—“An improved apparatus for heating water by means of exhaust steam.”

An apparatus for heating water by means of exhaust steam from an engine and utilizing the same, causing a great saving in fuel of high pressure, either for stationary or portable engines. The apparatus is a flange pipe round or oblong for receiving the exhaust steam from an engine having an inlet and outlet, also internal pipes, covers, and dome for reversing the water of the internal pipes which receives the water from the pump through the apparatus and returns to the boiler.

A.D. 1873, February 3.—No. 398.

MARVAL, HENRY CHARLES, of Birmingham, in the county of Warwick.—(*A communication from General Hiram Berdan, of the city of New York, in the United States of America.*)—“Improvements in rifling barrels for breech-loading firearms.”

I make the rifling of the barrel to consist of a suitable number of broad shallow grooves separated from each other by very narrow lands.

In a transverse section the bottoms of the grooves are neither flat nor concentric with the axis of the bore, but each is curved to a radius equal or nearly equal to the whole diameter of the interior of the barrel measured from the bottom of one groove to the bottom of the opposite groove, and at the centre of the width of each groove.

From this method of forming the grooves it will be obvious that the internal diameter of the barrel measured at the corners of the grooves will be larger than the internal diameter measured at the centre of the width of the grooves; but the diameter across the corners will not be relatively so great as it would be if flat bottomed grooves were used.

Further, I make the lands to project towards the axis of the bore beyond the line of the bottoms of the grooves; that is to say, the smallest diameter of the bore at any given section is that which is measured across from the interior face of one land to that of the opposite land.

A.D. 1873, February 4.—No. 413.

MARVAL, HENRY CHARLES, of Birmingham, in the county of Warwick.—(*A communication from General Hiram Berdan, of the city of New York, in the United States of America.*)—“Improvements relating to the transformation and manufacture of rifled breech loading firearms.”

My invention consists, firstly, substantially in making the lands in the breech tube narrower than the lands in the barrel, so that when the breech tube is inserted in the barrel its lands conceal themselves behind

the lands in the barrel, and do not project on either side, even although the lands in the barrel may vary slightly in width from the barrels having been rifled with cutters of different widths.

I form inclined surfaces in the rear end of the barrel forward of the breech tube, and also in the forward end of the rifled tube, so that the bullet shall gradually enter the rifling in the barrel, and so that the said inclined surfaces may guide the bullet into a central position and obviate the ill effects of any slight discrepancies between the rifling in the tube and that in the barrel.

My invention consists, secondly, in rifling the forward end of the breech tube to a larger diameter than the interior of the barrel to which it is to be applied, so that the said forward end of the breech tube shall fit the outside of a cartridge case, having its forward end also rifled both externally and internally; that is to say, externally to fit the interior of the rifled breech tube as aforesaid, and internally, to fit the exterior of a bullet, which has been rifled so as to exactly fit the barrel before being inserted in the said cartridge case.

A.D. 1873, February 11.—No. 503.

NEWELL, LORENZO DOW, of the "Castle and Falcon," Aldersgate Street, in the city of London.—"Improvements in ships' berths and sofas."

A movable oscillating berth pivotted at the sides and ends on a frame. This is fixed or mounted on slides for adjustment, and can be pushed close to the wall of the cabin when not required to oscillate, and so allow of extra room. There is an adjustable balance weight and apparatus to enable the occupant to maintain the centre of gravity. Also a rod with an extending and shortening movement for securing the berth when it is about to be entered.

The sofas are generally on the same principle but pivotted at the ends only, the back being movable to form a top if required.

A.D. 1873, February 17.—No. 588.

HUTCHINGS, ANNETTA JANE HONOR, of Numbers 2 and 3, Quay Head, in the city and county of Bristol, widow.—"Improvements in spicing and preparing malt or distilled vinegar, rendering the same better suited for pickling purposes."

The inventor takes malt or distilled vinegar, chilis, cloves, ginger, pimento, mace, and nutmeg, all or some, and 1st, grinds and commingles together the spices; and 2nd, places the ground spice in an earthen or other vessel with perforations in the bottom, which vessel is placed in another earthen or other vessel. Both vessels are placed in a boiler, the vinegar being poured into the inner vessel upon the spices, and the contents of the boiler being kept simmering for a sufficient time, the strength of the spices is drawn out into the second vessel, and upon being filtered is fit for bottling.

A.D. 1873, April 3.—No. 1241.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from John Fisher Taylor, of Charleston, state of South Carolina, United States of America.*)—"Improvements in steam and hydraulic presses."

This invention relates to a press for cotton or any other material in which the platen is operated by the introduction beneath the rams of oil or some other liquid under pressure communicated to said liquid by the pistons of steam cylinders, and in which the platen is lowered by its own weight and the expansion of the material compressed, both acting, through the medium of the liquid upon the pistons, which are permitted to yield by the opening of valves in the ends of the cylinders in rear of the pistons through which steam escapes before the returning pistons, the pistons acting upon the platen alternately (one to impart the initial pressure and the other the finishing pressure), the piston that imparts the initial pressure being operated by the exhaust steam of the other cylinder (or with live steam) which is then discharged into the atmosphere. The piston that imparts the finishing pressure is operated by live steam from the boiler, which is subsequently discharged into the other cylinder, there to communicate another initial pressure to the platen.

A.D. 1873, May 16.—No. 1790.

BACON, EDWARD (junior), of 7, Somerleyton Road, Brixton, in the county of Surrey, gentleman.—"An improved needle threader."

The utility of my invention is, in making the bows of a pair of scissors act as a needle threader. Between the bows of the scissors on each side or part that touch when closed I cut a notch or groove (longways)

about $\frac{1}{2}$ an inch long. I then on front of the scissors between the closed bows drill a conic hole right through, just above the notch or groove. To thread a needle I hold the scissors upsidedown in my left hand and then insert the needle, eye downwards, into the notch or groove, till the eye of the needle falls to the conic hole. I put the thread through the conic hole at the same time it passes through the eye of the needle. I open the scissors to release the needle threaded.

A.D. 1873, July 14.—No. 2416.

BOUJU, MARCELLIN RÉNÉ, merchant, of 69, Rue d'Aboukir, Paris, France.—“Improvements in “apparatus for the manufacture of cardboard and paper pulp from vegetable plants and filamentous and “fibrous shrubs.”

The substance to be treated is first soaked in water to give it the proper consistency and prevent its reduction to power.

The machine consist of a cast iron frame surmounted by a funnel for supplying it, this frame supports a cylindrical iron case within which two wheels are arranged on a vertical shaft one end of which turns on an axis borne by a plumber block or otherwise. The lower wheel is fixed and receives motion from the upper one; this fixed wheel bears on its upper surface and in its centre a circular opening to leave room for the movement and action of a cutting and crushing blade necessary for the operation of crushing and tritulating the fibres.

The horizontal internal surface of the wheels is dressed in the usual manner.

The other end of the shaft bears gear wheels in communication with a toothed wheel of a governing shaft by aid of a pinion fixed thereto for establishing between the governing shaft and the apparatus the requisite rotary motion for actuating the wheels.

The machine is furnished with a discharge pipe and a reservoir for the reception of the material when crushed.

A.D. 1873, July 14.—No. 2420.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane in the county of Middlesex, patent agent.—(*A communication from William O'Donoghue and James Dennis O'Donoghue, both of the city, county, and state of New York, United States of America.*)—“An improved tooth brush.”

The invention consists of a small convex brush for cleaning the inner walls of the teeth attached to a handle in such manner that while the said handle enters the mouth between the teeth the brush will come against the latter either upper or lower according to which way the handle is turned.

This brush may be used separately or be attached to the handle of an ordinary tooth brush.

A.D. 1873, July 15.—No. 2435.

FISHER, ROBERT ANDREWS, of San Francisco, California, in the United States of America.—“Improvements in preventing iron and steel from wasting away by oxidation, corrosion, or other causes, thereby “preventing incrustation in steam boilers and water tuyeres.”

This invention consists in bringing in direct contact with the iron or steel and any natural water or artificial aqueous solution of saline or other substances a metal or combination of metals more easily oxidized or otherwise corroded or eroded by oxygen, chlorine, or any other matter than iron or steel is oxidized or otherwise corroded by such contact.

The metals employed for this purpose, either separately or in combination with each other in the form of an alloy or amalgam, are:—Aluminium, antimony, cadmium, lead, magnesium, mercury, tin, and zinc, or any equivalent of either one or more of these metals, which all belong to a class in which the oxides of the metals are insoluble in water.

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[The names printed in *Italic* are those of the persons by whom the inventions have been communicated to the Applicants for Letters Patent. The consecutive numbers of the Applications, which are prefixed to the Abridgments contained in this volume, follow the names. The names distinguished by this addition (*App.*) belong to the Abridgments in the Appendixes. The Appendixes Nos. 30 to 52 were published with the corresponding weekly Nos. of the Chronological and Descriptive Index for the year 1872, and the Appendixes Nos. 1 to 3 with the weekly Nos. of the Index for the present year.]

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Brown, W. M., 822 (*App.* 36.) Boots and shoes; 1233 (*App.* 40.) Granulators; 1901 (*App.* 48.) Hydraulic hose.
Bruneaux, L., 1644 (*App.* 45.) Hydro-caloric motors.
Buckley, S., 44, Pipe wrenches and cutters.
Bullock, A., 171, Preventing incrustation in steam-boilers.
Bunster, C. E. W., 15, Aërial tramways.
Buquoy, X., 2393 (*App.* 2.) Dredging machines.
Burt, J. U., 57, Carriages.
Burton, P., 47, Railway carriages.

C.

Canning, Sir S., 120, Ships' telegraphic apparatus.
Capewell, G. J., 64, Nail extractors.
Cardon-Wamain, J. T., jun., 203, Fibres.
Carmichael, H., 72, Bleaching, dyeing and washing.
Carrington, W. T. H., 156, Fire-places.
Carty, B. F. Mc, 681 (*App.* 35.) Economizing fuel.
Cederholm, H. S., 1394 (*App.* 42.) Ships' logs.
Chapman, L., 2281 (*App.* 1.) Rotary pumps.
Charlesworth, G., 114, Weaving.
Chislett, J. R., 87, Medical electricity.

Chodzko, N. F. B. de, 124, Steam-boilers.
 Clark, A. M., 109, Condensing liquefiable matters;
 189, Velocipedes; 320 (*App. 1.*) Wire; 355
 (*App. 31.*) Sifting shovels; 1241 (*App. 3.*) Presses;
 2012 (*App. 49.*) Stone cutters; 2190 (*App. 52.*)
 Printing oil-cloth, &c.; 2420 (*App. 3.*) Tooth
 brushes.
 Clark, E., 611 (*App. 34.*) Raising and lowering
 ships.
 Clarke, T. A. W., 108, Crimping hair.
 Cloughton, H. O., 13, Cart saddles.
 Clayton, G., 148, Miners' safety lamps.
 Clean, F. Mc, 41, Raising ships.
 Clure, W. B. Mc, 13, Cart saddles.
 Cochrane, H., 1187 (*App. 40.*) Knives and forks.
 Cocker, J., 1084 (*App. 1.*) Spinning.
 Codd, H., 75, Bottles; 221, Tramways.
 Cole, F., 110, Air-engines.
 Conder, E., 32, Mechanical motive-power.
 Cookerly, M., 459 (*App. 33.*) Hoes.
 Cooper, J., 16, Casting metals.
 Coubro, T. P., 185, Ships' sails.
 Coulter, J., 159, Governors.
 Cowles, E., 99, Cooling candle moulds.
 Cowper, E. A., 131, Sewing boots and shoes.
 Cox, J., 214, Extracting and recovering oils, fats, &c.
 Cox, S., 214, Extracting and recovering oils, fats, &c.
 Craven, T. C., 22, Ginning cotton.
 Crispin, W. H., 122, Furnaces.
 Croll, A. A., 45, Distilling liquors, &c.
 Curtis, F., 769 (*App. 36.*) Paper-making; 1924
 (*App. 48.*) Steam-boilers and engines; 2238
 (*App. 52.*) Sewing boots and shoes; 2389 (*App.*
 2.) Cutting precious stones.
 Cutter, J. M., 1646 (*App. 45.*) Valves.

D.

Davies, R. V., 210, Water waste preventers.
 Davis, G., 162, Ships' davits.
 Davis, J., 2353 (*App. 2.*) Tanning.
 De Chodzko, N. F. B., 124 Steam-boilers.
 De Kercado, G. T., 104 Water meters.
 Dean, G. W., 355 (*App. 31.*) Sifting shovels.
 Dean, S., 259 (*App. 30.*) Dressing mill-stones.
 Decastro, D., 12, Wet gas meters.
 Delessert, H. E., 157, Carriages.
 Demailly, G., 1644 (*App. 45.*) Hydro-caloric mo-
 tors.
 Den Bergh, J. Van, 8, Harness.
 Denby, W. S., 192, Gully traps.
 Deregnaucourt, A., 103, Boots and shoes.
 Digney, J. D., 247 (*App. 3.*) Signals.
 Digney, T. S., 247 (*App. 3.*) Signals.
 Dixon, J., 222, Bridges and viaducts.
 Dodge, T. A., 1901 (*App. 48.*) Hydraulic hose.
 Donisthorpe, R. F., 108, Crimping hair.
 Donoghue, J. D. O., 2420 (*App. 3.*) Tooth brushes.
 Donoghue, W. O., 2420 (*App. 3.*) Tooth brushes.
 Dougherty, W., 932 (*App. 37.*) Casting metals.
 Doury, P., 89, Waterwheels.
 Drummond, D., 6, Casting metals.
 Du Bois, C., 1250 (*App. 40.*) Elevating apparatus.
 Ducomet, J., 2377 (*App. 2.*) Nets.

Duffee, E., 1575 (*App. 44.*) Gas.
 Dupuch, G. J., 33, Water gauges.

E.

Eaton, R., 26, Grinding corn.
 Eayrs, W. P., 2354 (*App. 2.*) Rotary engines.
 Eickemeyer, R., 76, Hats.
 Elmslie, E. W., 211, Opening cases, boxes and cans.
 Emmens, S. H., 2108 (*App. 51.*) Signals.
 Erskine, F., 192, Gully traps.
 Evans, W. N., 14, Tanning.
 Evans, W. R., 2261 (*App. 1.*) Fire-arms.

F.

Farrow, C., 218, Bottle stoppers.
 Fawcett, T., 159, Governors.
 Fay, W. C., 1101 (*App. 39.*) Fibres.
 Fenn, A. G., 56, Signals.
 Field, C. M., 2389 (*App. 2.*) Cutting precious stones.
 Fisher, R. A., 2435 (*App. 3.*) Preserving iron and
 steel.
 Fisk, F., 1584 (*App. 44.*) Printing telegraphs.
 Folk, J. E., 19, Dies.
 Forest, H., 247 (*App. 3.*) Signals.
 Forrest, H. E., 610 (*App. 34.*) Turning axles.
 Foulis, W., 59, Charging and drawing retorts.
 Fowler, H., 77, Hospital beds.
 Freeman, H. O., 980 (*App. 38.*) Cheese.
 Fuller, T., 161, Billiard cues.

G.

Gardiner, P. G., 37, Springs.
 Garon, F., 62, Stoves.
 Garth, R. F., 145, Treating hides, cotton waste and
 seeds.
 Gay, P., 95, Excavating minerals.
 Gedge, W. E., 104, Water meters; 202, Cocks and
 vent pegs.
 Gense, C., 130, Mattresses.
 George, C., 224, Barometers.
 Gibson, R. H., 119, Desks and seats.
 Gilbee, W. A., 564 (*App. 34.*) Nets.
 Gillespie, J., 1062 (*App. 38.*) Bungs and bung in-
 serters.
 Glen, G., 176, Railway and tramway rolling stock.
 Goddu, L., 1313 (*App. 41.*) Monitors.
 Goodrich, G. W., 90, Puddling furnaces.
 Goodrich, L. S., 90, Puddling furnaces.
 Gordon, J., 10, Envelopes.
 Goueslain, A., 202, Cocks and vent pegs.
 Gould, S. L., 769 (*App. 36.*) Paper-making.
 Graham, J. C., 13, Cart saddles.
 Gray, R. B., 1233 (*App. 40.*) Granulators.
 Griffith, J., 2170 (*App. 52.*) Steam-boilers.
 Grigg, W., 786 (*App. 36.*) Applying electricity to
 cattle.
 Griswold, L., 2176 (*App. 52.*) Sewing-machines.

Guernsey, J. W., 1352 (*App.* 42.) Shearing animals.
 Guerriero, A., *Comte de St. Ange*, 2184 (*App.* 52.)
 Horse-shoes.
 Gumpel, C. G., 9, Lowering ships' boats.

H.

Haas, B., jun., 2231 (*App.* 52.) Dial indicators for
 carriages.
 Hadfield, R., 1787 (*App.* 46.) Wheels, axles, shafts.
 Haggett, W., 1461 (*App.* 43.) Metals.
 Haight, H. J., 966 (*App.* 38.) Artists' scrapers.
 Hall, J. H., 26, Grinding corn.
 Hamilton, E. C., 187, Manure.
 Hampton, T., 842 (*App.* 37.) Armour plates.
 Harding, G. E., 2064 (*App.* 50.) Furnaces.
 Harrison, B., 32, Mechanical motive-power.
 Harrison, C., 121, Umbrellas, parasols and sun-
 shades.
 Harrison, C. W., 1, Air-gas.
 Hartley, R., 81, Singeing yarn.
 Harwood, I. K., 967 (*App.* 38.) Pumps.
 Haseltine, G., 13, cart saddles; 77, Hospital beds;
 126, Projectiles; 128, Rolling metals; 213
 White lead; 233 (*App.* 30.) Washers; 259
 (*App.* 30.) Dressing mill-stones; 303 (*App.* 31.)
 Hinges; 351 (*App.* 31.) Torpedo launches; 459
 (*App.* 33.) Hoes; 681 (*App.* 35.) Economizing
 fuel; 806 (*App.* 36.) Lamps; 932 (*App.* 37.)
 Casting metals; 967 (*App.* 38.) Pumps; 1250
 (*App.* 40.) Elevating apparatus; 1352 (*App.* 42.)
 Shearing animals; 1517 (*App.* 44.) Railway
 carriage-couplings; 1622 (*App.* 45.) Paper bags;
 1641 (*App.* 45.) Separating liquids and sub-
 stances; 2064 (*App.* 50.) Furnaces; 2212
 (*App.* 52.) Sewing-machines; 2255 (*App.* 1.)
 Valves; 2257 (*App.* 1.) Inhaling apparatus;
 2270 (*App.* 1.) Railway watering columns; 2284
 (*App.* 1.) Weaving; 2287 (*App.* 1.) Reaping
 and mowing; 2311 (*App.* 1.) Distilling turpen-
 tine; 2353 (*App.* 2.) Tanning; 2354 (*App.* 2.)
 Rotary engines.
 Hawkins, J. G., 220, Gas.
 Haycock, S. H., 126, Projectiles.
 Hayek, —, 310 (*App.* 31.) Artificial stone.
 Henderson, A. C., 1644 (*App.* 45.) Hydro-caloric
 motors.
 Henley, T. F., 212, Meat extract.
 Henry, M., 33, Water gauges.
 Henson, H. H., 191, Shaping and punching iron.
 Herrick, S. K., 2185 (*App.* 52.) Sewing-machines.
 Hersey, C. H., 1233 (*App.* 40.) Granulators.
 Hersey, F. C., 1233 (*App.* 40.) Granulators.
 Hewett, S. B., 1793 (*App.* 46.) Fire-places.
 Heyworth, E., 1890 (*App.* 48.) Steam-boilers.
 Highton, H., 85, Electric telegraphs.
 Hillmann, J. H., 90, Puddling furnaces.
 Hindley, G., 178, Dressing stone.
 Hipkins, E., 165, Iron safes.
 Hitchcock, R., 356 (*App.* 31.) Lamps.
 Hodges, S. H., 1380 (*App.* 42.) Boots and shoes.
 Hodson, H. F., 93, Agricultural and horticultural
 implements.
 Hollingworth, J., 1464 (*App.* 43.) Weaving.

Holman, S., 115, Gas retort mouthpieces, lids and
 fasteners; 136, Raising and lowering gas puri-
 fier lids, &c.
 Holmes, J. E., 98, Centrifugal machines and kilns.
 Hopkinson, J. T., 181, window fasteners.
 Horner, G., 188, Spinning.
 Horsley, T., jun., 204, Closing cartridge cases.
 Howard, E. I., 2255 (*App.* 1.) Valves.
 Howlett, E. J., 1622 (*App.* 45.) Paper bags.
 Hugall, C. E., 177, Window fasteners.
 Hughes, E. T., 63, Towing canal boats.
 Hughes, P., 96, Dishes and plates.
 Hunt, B., 40, Printing telegraphs.
 Hunt, S., 142, Building blocks.
 Hunter, C. D., 2257 (*App.* 1.) Inhaling apparatus.
 Huntington, F. A., 1753 (*App.* 46.) Steam boilers
 and furnaces.
 Hutchings, A. J. H., 588 (*App.* 3.) Pickling.
 Hutchinson, J., 1464 (*App.* 43.) Weaving.

I.

Imray, J., 309 (*App.* 1.) Steam-boilers; 325 (*App.*
 1.) Heating, evaporating, distilling, &c.

J.

Jackson, W., 338 (*App.* 3.) Heating feed water.
 Janney, E. H., 1517 (*App.* 44.) Railway carriage-
 couplings.
 Jarman, H., 164, Steering ships.
 Jaynor, A., 66, Steering and hoisting.
 Jensen, P., 149, Printing telegraphs.
 Jewitt, H., 55, Toys.
 Johnson, J. H., 18, Spinning; 43, Transmitting
 power; 155, Fire-arms; 247 (*App.* 3.) Signals;
 356 (*App.* 31.) Lamps; 1234 (*App.* 40.) Steam-
 engines; 1947 (*App.* 48.) Speed indicators;
 2061 (*App.* 50.) Casting metals.
 Johnson, J. O., 2342 (*App.* 2.) Fluid meters.
 Jones, H., 187, Manure.
 Jones, W., 118, Valves.

K.

Kalmar, A., 5, Compasses.
 Kercado, G. T. de, 104, Water meters.
 Kesterton, H., 53, Rolling metals; 54, Metal
 telegraph posts.
 King, J. A., 116, Peat-fuel.
 Kininmonth, J., 102, Bakers' ovens.
 Kirkman, J., 200, Governors.
 Knight, E., 806 (*App.* 36.) Lamps.
 Knowles, M., 105, Weaving.
 Konn, S. W., 91, Electrical heat.
 Krausse, H., 80, Air-gas.
 Kref, F., 1584 (*App.* 44.) Printing telegraphs.

L.

Laak, L. Van, 1062 (*App.* 38.) Bungs and bung inserters.
 Lacon, W. S., 186, Lowering ships' boats.
 Lake, W. R., 26, Grinding corn; 27, Cleaning horses; 79, Thread spools; 80, Air-gas; 127, Pipe-joints, elbows or couplings; 225, Fireproof vaults; 226, Fireproof safes; 227, Boots and shoes; 558 (*App.* 33.) Drilling and boring; 1737 *App.* 46.) Veneers; 1770 (*App.* 1.) Trac-tion-engines.
 Lamb, J. W., 73, Knitting machines.
 Lanier, G. P., 130, Mattresses.
 Lartigue, H., 247 (*App.* 3.) Signals.
 Larue, J., 172, Printing.
 Latham, B., 331 (*App.* 47.) Manure.
 Law, J., 71, Carding-engines.
 Law, S., 71, Carding-engines.
 Laycock, T., 1078 (*App.* 39.) Sewing-machines.
 Leatham, W., 30, Valves.
 Lee, H., 2287 (*App.* 1.) Reaping and mowing.
 Lee, J. H., 594 (*App.* 34.) Steam-boilers and engines.
 Lee, R. B., 190, Metal telegraph posts.
 Leeming, T., 46, Bronzing and coloring paper, &c.
 Leigh, J. S., 15, Aërial tramways.
 Leon, W. F., 2057 (*App.* 50.) Hydraulic hoists.
 Lloyd, R., 2311 (*App.* 1.) Distilling turpentine.
 Loddell, G. G., 2061 (*App.* 50.) Casting metals.
 Lodighin, A. N., 91, Electrical heat.
 Loo-Wauters, F. Van, 63, Towing canal boats.
 Loryea, A. M., 217, Hydraulic motive-power.
 Lowe, O., 36, Steam-boilers.
 Lowe, S., 73, Knitting machines.
 Lynde, F. G., 46, Bronzing and coloring paper, &c.
 Lyttle, W. A., 52, Roofs, floors and pavements; 158, Railway chairs.

M.

McCarty, B. F., 681 (*App.* 35.) Economizing fuel.
 McClean, F., 41, Raising ships.
 McClure, W. B., 13, Cart-saddles.
 McWilliams, A. S., 2005 (*App.* 49.) Sheep shears.
 Macaulay, H., 92, Fire-arms.
 Macneill, Sir J., 206, Tramways and carriages.
 Macneill, R., 184, Pavements.
 Maitre, E., 2010 (*App.* 49.) Covering surfaces with wood.
 Manbré, A., 2, Valves.
 Martin, B. G., 486 (*App.* 33.) Presses; 1148 (*App.* 39.) Presses.
 Martin, C., 174, Spinning.
 Marval, H. C., 398 (*App.* 3.) Fire-arms; 413 (*App.* 3.) Fire-arms.
 Mason, F. H., 681 (*App.* 35.) Economizing fuel.
 Masourine, M. S., 207, Caissons.
 Matthews, W. J., 138, Fire-arms.
 Mayers, H., 2057 (*App.* 50.) Hydraulic hoists.
 Meakin, G. F. L., 1179 (*App.* 49.) Hanging sashes and shutters.
 Mellor, W. W., 132, Cutting glass.

Meylert, A. P., 213, White lead.
 Michaud, P. F., 629 (*App.* 34.) Axle-boxes.
 Mickle, W., 803 (*App.* 36.) Smelting and puddling iron; 921 (*App.* 37.) Economizing fuel; 1656 (*App.* 45.) Economizing fuel.
 Miller, S. H., 19, Dies.
 Mills, J. H., 1924 (*App.* 48.) Steam-boilers and engines.
 Mills, J., L., 123, Printing.
 Milner, E., 196, Lubricating.
 Monkhouse, T. S., 123, Printing.
 Moody, C., 2023 (*App.* 49.) Locks.
 Morgan-Brown, W., 822 (*App.* 36.) Boots and shoes; 1233 (*App.* 40.) Granulators; 1901 (*App.* 48.) Hydraulic hose.
 Morris, E. R., 29, Chartometers.
 Myers, A. G., 127, Pipe-joints, elbows or couplings.

N.

Naylor, M., 167, Weaving.
 Needham, J., 31, Fire-arms and cartridges.
 Neil, W., 2067 (*App.* 50.) Distilling spirituous liquors.
 Newcomb, W., 967 (*App.* 38.) Pumps.
 Newell, L. D., 503 (*App.* 3.) Ships' berths and sofas.
 Newton, A. V., 20, Paper-ruling machines.
 Newton, W. E., 19, Dies; 28, Musical instru-ments; 89, Waterwheels; 90, Puddling fur-naces.
 Nichols, F. W., 303 (*App.* 31.) Hinges.
 Nichols, J., 215, Ventilating waterclosets, &c.
 Norman, J., 135, Clipping animals.

O.

O'Donoghue, J. D., 2420 (*App.* 3.) Tooth brushes.
 O'Donoghue, W., 2420 (*App.* 3.) Tooth brushes.
 Oldknow, J., 24, Lace-making.
 Olds, P. F., 681 (*App.* 35.) Economizing fuel.
 Olley, G., 338 (*App.* 3.) Heating feed water.
 Olsen, C. H. G., 149, Printing telegraphs.
 Onderdonk, J. P., 1622 (*App.* 45.) Paper bags.
 Osborne, D. T., 198, Self feeding air-tight stoves.
 Osborne, J. W., 1947 (*App.* 48.) Speed indicators.
 Owen, J., 160, Mine shafts and hoists.

P.

Paddison, H., 193, Breakwaters, docks, piers, &c.
 Page, R. W., 107, Cutting screws.
 Paget, F. A., 5, Compasses.
 Palmer, R., 198, Self feeding air-tight stoves.
 Parker-Rhodes, C. E., 173, Illuminating clocks, names, signs, &c.
 Parlour, J. T., 25, Cabs and other vehicles; 144, Wheels for carriages.
 Pearl, O., 18, Spinning.
 Pearson, W., 121, Umbrellas, parasols and sun-shades.

Peebles, D. B., 7, Gas regulators.
Pelouze, E. P., 109, Condensing liquefiable matters.
Pengilly, C., 563 (*App. 34.*) Filters.
Perkins, C. H., 128, Rolling metals.
Perman, C. H., 194, Metallic boxes.
Petersen, C., 1394 (*App. 42.*) Ships' logs.
Philippi, F., 11, Smelling bottles.
Picq, H., 43, Transmitting power.
Pitcher, W., 146, Craping hair, &c.
Platt, J., 156, Fire-places.
Plessner, J. M., 180, Lamps.
Poage, J. N., 2270 (*App. 1.*) Railway watering columns.
Pohl, O. E., 4, Salt.
Pope, F. L., 1641 (*App. 45.*) Separating liquids and substances.
Porter, B., 201, Weaving.
Porter, H., 224, Barometers.
Power, H. L., 152, Umbrellas.
Pratt, W. T. C., 150, Steering ships.
Preece, W. H., 153, Railway signals.
Preston, W. R., 187, Manure.
Pringle, C., 594 (*App. 34.*) Steam-boilers and engines.
Pritchard, G., 106, Metal tubes and bars.
Procope, M., 564 (*App. 34.*) Nets.
Purdie, J., 233 (*App. 30.*) Washers.

Q.

Quelch, W. B., 141, Heating and ventilating buildings.
Quesnel, G., 309 (*App. 1.*) Steam-boilers.
Quintavalle, R., 150, Steering ships.

R.

Ray, R., 46, Bronzing and coloring paper, &c.
Rawle, G., 14, Tanning.
Redgrave, J., 223, Glass vessels.
Reed, J. H., 1052 (*App. 38.*) Pegging boots and shoes.
Rhodes, C. E. P., 173, Illuminating clocks, names, signs, &c.
Rippon, E. C., 2108 (*App. 51.*) Signals.
Ritchell, C. F., 558 (*App. 33.*) Drilling and boring.
Roberts, L., 94, Railway rails.
Robertson, J., 248 (*App. 3.*) Forcing, exhausting and measuring air, gas, &c.
Robinson, W., 67, Signals.
Rogers, H., 129, Carriages.
Rogers, S. A., 190, Metal telegraph posts.
Ross, W. V. V., 356 (*App. 31.*) Lamps.
Rose, W. W., 55, Toys.
Rosenfield, A., 2057 (*App. 50.*) Hydraulic hoists.
Ross, J., 2238 (*App. 52.*) Sewing boots and shoes.
Ross, L. E., 2284 (*App. 1.*) Weaving.
Roturier, J., 101, Turning the leaves of music books.
Rowland, T. F., 1287 (*App. 41.*) Gas retorts.
Rydill, G., 82, Drying-machines.
Ryle, J., jun., 2332 (*App. 2.*) Refrigerators.

S.

Salleron, J., 509 (*App. 33.*) Corks.
Salmon, P., 147, Gas, oil-gas engines and boilers.
Samain, P., 1944 (*App. 48.*) Fire-arms.
Sawyer, A. F., 217, Hydraulic motive-power.
Sawyer, W. H., 1641 (*App. 45.*) Separating liquids and substances.
Scheidecker, C., 661 (*App. 34.*) Shearing animals.
Schenck, —, Bart., 310 (*App. 31.*) Artificial stone.
Schmidt, H., 88, Marking timber, &c.
Schoevers, A. T. C., 84, Trusses for hernia.
Scholefield, R., 170, Brick making.
Schwarz, L., 2218 (*App. 52.*) Economizing fuel.
Schwarzenbach, V., 208, Gilding on glass.
Scollay, G. W., 1815 (*App. 47.*) Preserving food.
Scott, H. Y. D., 154, Treating sewage; 183, Purifying coal gas.
Scott, W., 138, Fire-arms.
Seeling, H., 79, Thread spools.
Seiferheld, A., 103, Boots and shoes.
Seitz, C. D. J., 197, Paper making.
Shanks, J., 199, Water supplying.
Shaw, J., 597 (*App. 2.*) Punching and shearing.
Shaw, W., 1298 (*App. 41.*) Printing.
Shedd, W., 1101 (*App. 39.*) Fibres.
Sholl, C., 525 (*App. 1.*) Atmospheric hammers.
Shuttleworth, J., 1078 (*App. 39.*) Sewing-machines.
Sigourney, J. M., 356 (*App. 31.*) Lamps.
Small, J. H., 27, Cleaning horses.
Smith, A. H., 23, Crushing stone, &c.
Smith, D., 1079 (*App. 39.*) Railways.
Smith, G., 70, Ventilating boots and shoes.
Smith, H. J., 351 (*App. 31.*) Torpedo launches.
Smith, T. J., 124, Steam-boilers.
Smith, W. B., 133, Sewing machines.
Soul, M. A., 101, Turning the leaves of music books.
Sowerbutts, A., 100, Raising ships.
Spence, P., 50, Treating waste liquors in alum works.
Sprague, W., 1770 (*App. 1.*) Traction-engines.
St. Ange, Comte de, 2184 (*App. 52.*) Horse-shoes.
Stacy, G., 2012 (*App. 49.*) Stone cutters.
Starley, J., 133, Sewing machines.
Stebins, T., 2057 (*App. 50.*) Hydraulic hoists.
Steinhoff, G., 88, Marking timber, &c.
Stell, S., 111, Consuming smoke and saving fuel.
Stephens, L. A., 97, Bottles and corks.
Stephens, W. B., 35, Paints.
Sterling, W. H., 2022 (*App. 49.*) Preserving iron.
Stevens, L., 216, Carbonic oxide.
Stidder, J. G., 236 (*App. 30.*) Water waste preventers.
Stroudley, W., 6, Casting metals.
Stuart, D., 155, Fire-arms.
Stuart, T. E., 2354 (*App. 2.*) Rotary engines.
Sutcliffe, W., 148, Miners' safety lamps.
Suzanne, P. A. L., 140, Imitation school slates, tablets, &c.

T.

Target, J. L. F., 168, Treating sewage.
Taylor, J. F., 1241, Presses.

Tesseyman, J., 2255 (*App. 1.*) Valves.
Thompson, W. G., 42, Extracting oleaginous matters.
Thwaites, R., 97, Bottles and corks.
Tiffany, J. C., 798 (*App. 36.*) Oil-gas.
Tongue, J. G., 140, Imitation school slates, tablets, &c.
Touaillon, C., 2184 (*App. 52.*) Horse-shoes.
Townsend, W. H., 2190 (*App. 52.*) Printing oil-cloths, &c.
Trippe, F. J., 134, Cutting textile fabrics.
Turner, G., 60, Venetian blinds.
Turton, T., 169, Hydraulic propellers.
Turton, W., 129, Carriages.

U.

Ulery, W. G., 1234 (*App. 40.*) Steam-engines.
Ullmann, S., 112, Trousers and suspenders.
Umbers, E., 56, Signals.
Unsworth, T., 195, Doubling machines.

V.

Van Den Bergh, J., 8, Harness.
Van Laak, L., 1062 (*App. 38.*) Bungs and bung inserters.
Van Loo-Wauters, F., 63, Towing canal boats.
Vandermeersch, A. H., 155, Fire-arms.
Vaughan, E. P. H., 661 (*App. 34.*) Shearing animals.

W.

Walker, A., jun., 58, Steam-boilers.
Waller, I., 77, Hospital beds.
Walpole, J., 125, Double furrow ploughs.
Wamain, J. T. C., jun., 203, Fibres.
Warner, J. W., 225, Fireproof vaults; 226, Fireproof safes.
Warth, A., 1572 (*App. 44.*) Piling textile fabrics.
Watson, A., 137, Combined thrashing machine and elevator.
Wattles, J. W., 166, Spinning.
Wauters, F. Van L., 63, Towing canal boats.

Webb, A. E., 728 (*App. 46.*) Candles and night-lights.
Weber, L., 1270 (*App. 41.*) Galvanic batteries.
Weekes, C., 209, Fire lighters.
Weisker, B., 2092 (*App. 50.*) Ship-building.
Welch, E. B., 40, Printing telegraphs.
Welch, E. J. C., 51, Safety valves.
Wells, R. G., 219, Theatrical and scientific exhibitions, &c.
Werdermann, R., 474 (*App. 33.*) Metals.
Wheeler, H. F., 1380 (*App. 42.*) Boots and shoes.
Whipp, J., 132, Cutting glass.
Whitaker, R., 194, Metallic boxes.
Whitburn, T., 48, Printing.
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AND TO

APPENDIXES FROM JAN. 19, TO JULY 18, 1873.

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 4. Index of Subject-matter to Chronological and Descriptive Index from January 1 to January 18, 1873, and to Appendixes from January 19 to July 18, 1873.
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**CHRONOLOGICAL AND DESCRIPTIVE INDEX
OF PATENTS APPLIED FOR AND PATENTS GRANTED,**

CONTAINING THE

ABRIDGMENTS OF PROVISIONAL AND COMPLETE SPECIFICATIONS

Delivered from January 19 to January 25, 1873.

A.D. 1873, January 20.—No. 228.

BOWRA, MATTHIAS EDWARD, of Upper Norwood, in the county of Surrey, and **WOOD, THOMAS**, of Adelaide Road, in the county of Middlesex.—“Improvements in the manufacture of elastic fabrics.”

First. We prepare webbing or other cloth made of silk, wool, cotton, or other suitable material with a preparation of india rubber or other elastic gums to impart the necessary substance or strength.

Second. The webbing or cloth so prepared we then unite with sheets of india rubber or other elastic gums to impart the requisite solidity and elasticity.

Third. We perforate and ventilate the materials so arranged by rolls or by other suitable mechanical methods when desirable.

A.D. 1873, January 20.—No. 229.

RYDILL, GEORGE, of Grove House, Dewsbury, in the county of York.—“Improvements in machinery and apparatus for dyeing, staining, and drying animal and vegetable substances, and for bleaching purposes.”

This invention consists in machinery and apparatus for evenly arranging and exposing piece goods, animal and vegetable substances to the action of mordants and dye colouring or staining matters and avoiding the winceing of piece goods, also the working and opening out of the piece goods by hand with sticks, as they revolve over the wince, which are now fixed over dye vessels preventing hawking of piece goods and wool and facilitating the process of dyeing piece goods.

A.D. 1873, January 20.—No. 230.

ROBEY, JAMES, of the city of Manchester, sugar refiner.—“A new or improved charcoal to be used for purifying sewage and other foul waters, and for disinfecting and deodorising purposes.”

The features of novelty in this invention consist in drying and charring the sludge or precipitant obtained by treating sewage after the manner of the Native Guano Company, Limited, when practising according to either of the two Patents granted to Messieurs Sillar and Wigner, bearing date, the 15th June 1868, No. 1954, and to W. Wigner, bearing date the 12th May 1870, No. 1354, in both of which Patents clay is the principal precipitant, or the sludge or precipitant obtained by treating sewage by other precipitating processes in which clay is used, and so producing a charcoal which is useful for the various purposes described; or a similar charcoal is produced by mixing clay with the refuse carbonaceous matter from prussiate of potash manufactories and then charring the mixture.

A.D. 1873, January 20.—No. 231.

STONE, THOMAS, of Preston, in the county of Lancaster, engineer and machinist.—“Improvements in carding engines.”

The novelty and advantages of this invention are that the large cylinder is entirely dispensed with, and some of the rollers, clearers, and bends, thereby much reducing the bulk; the cotton made much cleaner and better carded than by any other means yet employed; the texture of the fibre unbroken or bruised, is well and evenly laid.

A.D. 1873, January 20.—No. 232.

BACON, JAMES, of Church, Gresley, in the county of Derby.—“Improvements in sheds or apparatus for drying bricks, pottery, or other articles.”

According to this Provisional Specification a number of drying chambers are arranged in an endless series
[No. 4.] Price 2d

round a continuous kiln, preferably that described in a former Provisional Specification No. 3635 of 1872. The drying chambers are heated by the waste heat from the chambers of the kiln. The bricks or other articles are laid on boards or pads which rest upon bearers about four inches apart.

A.D. 1873, January 20.—No. 233.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws.—(*A communication from John Purdie, of Buffalo, New York, United States of America, manufacturer.*)—"Improvements in locking washers for screw-nuts."

This invention consists, first, in a washer provided with one or more pivotted dogs, so arranged as to enter a recess in the washer-plate when the nut is being turned home, and swung out by the side of the nut when the nut is tightened, and remain in this projecting position by reason of its gravity, thereby preventing the unscrewing and loosening of the nut. Second, in the combination with a hinged dog of a locking washer, of a spiral spring, and a locking notch, so arranged that the dog when swung out against the side of the nut after the latter is tightened is forced by the said spiral spring laterally into the notch to be locked in position. Third, in a washer provided with a pivotted dog, which is locked in place by a flange thereof overlapped or caught by the corner of the nut when turned slightly backward.

A.D. 1873, January 20.—No. 234.

KNIGHT, JOSEPH, of Worcester, in the county of Worcester.—"Improvements in apparatus to be used in connection with the frames of umbrellas, parasols, and sunshades."

This invention consists in the construction and arrangement of apparatus by means of which the frames of umbrellas, parasols, and sunshades are held firmly either in an extended or closed position.

Two modifications are embraced by this invention.

First. A spring tooth catch is attached to a cylindrical tube which is fixed to the stick of the article to which the invention is applied above the part thereof which is covered by the "runner" when the ribs and stretchers are extended. A similar spring catch and tube are placed in like manner beyond that part of the stick which is covered by the "runner" when the ribs and stretchers are closed. Two tapered spring levers are attached to the "runner," by which the spring toothed catches are lifted when the "runner" is moved up or down the stick, until the tooth of the catch passes over the flange of the "runner" and holds the same firmly. The spring catches are respectively released by depressing the levers.

Secondly. Two flanged collars are placed on the stick in positions similar to those occupied by the said spring catches, and two spring toothed levers are attached to the "runner," moved up or down, the teeth pass over the respective flanges on the collars and hold the frame firmly, the spring tooth levers being released by depressing the ends thereof opposite to the teeth.

A.D. 1873, January 20.—No. 235.

BRIMLEY, CHARLES, of Cransley, near Kettering, in the county of Northampton, farmer.—"Improvements in reaping machinery."

The object of this invention is to provide a more efficient cutter for reaping machines than those at present in use. To attain this end, the cutter bar is fitted with a series of sickle blades, to which a motion like that which is given to the hand sickle by the reaper is imparted.

A.D. 1873, January 20.—No. 236.

STIDDER, JAMES GEORGE, of 50, Southwark Bridge Road, Borough, in the county of Surrey, sanitary engineer.—"Improvements in apparatus for drawing and preventing waste of water from pipes, mains, cisterns, and other sources, also ball and supply valves for domestic and other purposes."

This apparatus forms a water waste preventer, and works by the fork lever on top, which lever has a roller working a cam, and the other end of the cam controls the ball valve. There is a rod leading from the top lever to the discharge valve in the cistern. In no case can the supply valve and the discharge valve be open at the same time. The lower division forms an after charge. The lavatory supply valve works with a plunger, which works the spindle through a stuffing box; to the other end of the spindle is fixed a bucket leather (or piston), which works in a chamber in the inside of the other case. This arrangement stops all concussion in the pipes when at work. The urinal valve works exactly the same as above in the lower chambers, but the inside comes away from the front of valve when the cap is unscrewed. The

ball valve works with three levers, which is a treble compound motion; the last lever works against the seat on the inside of valve and shuts off the water under any pressure. The connection for urinals forms a stuffing box, which passes through the slates, with a fly nut and union on back and a socket and union on the front. This motion saves the breaking of slate joints to get at the union on the back. By unscrewing the gland nut on the front, the bend and socket come away with the urinal.

A.D. 1873, January 20.—No. 237.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from Henri Nicolas Rogé and Pierre Hippolyte Baffoy, both of Paris, France.*)—"Improved apparatus for working the switches or points of railways."

The apparatus consists of a projection carried on the engine and set by the driver for operating an arrangement of parts, placed on the line just above the level of the rails, whereby the tongue rails of the switches are worked for shifting a train from one line to another.

A.D. 1873, January 20.—No. 238.

BETTELEY, JOSEPH HENRY, engineer, and SHARER, THOMAS, gentleman, both of Gracechurch Street, in the city of London.—"Improvements in the construction of railway carriages and other rolling stock, and in apparatus connected therewith."

The features of novelty of this invention consist:

First. In placing the weight springs between the body and the under framing of the carriage, the body of the carriage and the under framing being made separate for that purpose.

Secondly. In dispensing with the ordinary buffers and arranging a continuous bar along the centre of the under framing, the said bar in conjunction with springs serving three purposes, namely for connecting one carriage to another, also as a draw bar and buffer.

Thirdly. In connecting the brake blocks by levers to a continuous bar running along the centre of the under framing of each carriage, the said bar having suitable screws or threads formed thereon, so that by turning round the said bar, and the bars of all the carriages being connected together, all the brakes may be brought into action at the same time. Another method consists in placing on the axles of each carriage a friction wheel and band worked by a lever connected with the aforesaid continuous bar and a cog wheel taking into teeth at that end of the said bar that comes under the brake van.

A.D. 1873, January 21.—No. 239.

WILSON, GEORGE, of Banner Cross, Sheffield, in the county of York.—"Improvements in bending armour plates, and in apparatus for that purpose."

This invention relates to the bending of armour plates, so that the convex surface is that which was uppermost in the furnace, being the most capable of resisting shot.

The plate to be bent is placed without inversion on a convex mould or on a truck, with a convex surface within a strong framing, and cross bars are forced down by wedges or screws, or a concave mould is forced down by hydraulic pressure, so as to bend the plate over the curved mould or truck, the uppermost surface of the plate being thus rendered convex.

A.D. 1873, January 21.—No. 240.

HOOKHAM, GEORGE, and HOOKHAM, HENRY JAMES, the younger, both of Birmingham, in the county of Warwick, tin plate workers and japanners.—"Improvements in fastenings for metallic travelling boxes and other metallic boxes."

This invention consists in jointing or hinging to the lower edge of the outside of the lid of the box a flap extending along the whole or greater part of the said edge for fixing the lid when shut down to the body of the box. On the lower edge of this hinged flap are three fixing plates, the middle one having a slot in it, and the end ones having pins or studs fixed on them. When the hinged flap is turned upon the body of the box after the lid has been shut down, the slot in the middle fixing plate passes onto a staple on the box, and the pins or studs on the end fixing plates enter holes in the said box. The middle fixing plate is then fastened by a padlock or other lock. The lid is thereby fastened down to the body of the box at its middle and at its ends, and the prizing or raising of the lid at its ends is prevented or rendered difficult.

A.D. 1873, January 21.—No. 241.

WILSON, THOMAS, of the city of London, merchant.—“Improvements in the method or means of propelling tramway cars and other carriages or vehicles, and in the apparatus or machinery to be employed therein or connected therewith.”

My invention relates to the construction and application of engines for propelling tramway cars and other carriages or vehicles, to be worked by compressed air, such air having been raised to the desired pressure by suitable machinery and stored in suitable reservoirs at fixed stations, where the reservoirs, carried on or otherwise attached to the cars, may be charged as required and the engines worked for any given time, according to the capacity of the reservoirs.

The first part of the invention relates to the cylinders, which may be single or double acting and two or more in number, attached in the ordinary way to cranks on the shaft of the driving wheels, or if single acting, the connecting rods may be attached direct to the pistons, the cylinders being open at the ends next the crank shaft.

The second part of the invention consists in forming a reservoir of small capacity as compared with the main reservoir, and in which the air may be kept at a constant pressure, whatever pressure it may have in the main reservoir.

The next part of my invention consists in surrounding the cylinders and reservoirs with a chamber or chambers, which may be kept filled with hot water or oil, for the purpose of giving out to the air during expansion the heat which had been evolved during compression.

Another part of my invention consists in constructing valves and packings, for engines worked by compressed air, of leather saturated with beeswax and tallow.

A further part of my invention consists in forming a reservoir for the final discharge of the steam from the last cylinder, in order that it may issue in a continuous stream instead of in puffs on each stroke of the engines.

And in order to aid in carrying out my invention I propose to arrange or have fixed stations at convenient places along the lines of tramway or other road or way, at which the air can be compressed and kept in large reservoirs for use at any time, and from which any number of tramway carriages or engines for moving the same or other vehicles can be charged as required.

A.D. 1873, January 21.—No. 242.

BATLEY, WILLIAM SHORT, of Rotherham, in the county of York.—“Improvements in machinery and apparatus for making bricks, tiles, or other similar articles.”

This invention relates, first, to an improved pug mill, in which the clay is mixed by blades upon a shaft revolving in a cylinder, into which the clay is fed at each end and is driven towards the centre, where it is discharged, by arranging the blades in different directions at the opposite ends of the cylinder. End thrust and wear of the driving shaft and bearings is thus neutralized and avoided. Sometimes a cylinder is used closed at one end, through which the clay is forced by means of blades arranged upon a shaft revolving in bearings entirely outside the cylinder.

The invention relates, secondly, to a novel self acting apparatus for cutting into suitable pieces the clay as it issues from the cylinder. For this purpose a disc is used, which is caused to revolve by the pressure of the issuing stream of clay against its edge. The disc is attached to a circular cam, divided into a suitable number of parts, so that at each division a lever is made to travel either backwards or forwards. This lever throws a constantly revolving cam into gear with either the front or back of the frame which carries the cutting wire or blade, which is thus made to pass rapidly across the issuing column of clay at each division of the circular cam first described.

The invention relates, thirdly, to an arrangement of an endless band for the purpose of carrying away the finished bricks as they are pushed upon the band by means of a bar, from a press of the kind ordinarily used for the purpose of making bricks, such endless band being used together with a similar one which feeds the pieces of clay into the press.

A.D. 1873, January 21.—No. 243.

EDWARDS, GRAHAM WILLIAM BETHAM, of Bredfield, in the county of Suffolk.—“Improvements in drills or machinery for distributing artificial manure and guano.”

According to these improvements artificial manure or guano is delivered from a hopper or receptacle mounted upon the drill or machine by means of a screw or hollow fluted spiral worm arranged in combination therewith. The manure falls from the hopper between the threads of the screw or worm, which conducts it

to an opening on one side of the chamber in which the screw or worm revolves, where it is delivered in a regular and uniform manner on to the land, the quantity thus distributed being regulated by the speed at which the screw is caused to revolve, the speed being regulated by the size of the toothed or driving wheel on the screw axis or by other suitable mechanical means.

The surfaces of the screw threads are prevented from clogging with the manure by means of a series of travelling blades or scrapers mounted upon an endless band and closing the front aperture of the box above the screw.

The blades or scrapers may be kept clean by means of a brush, knife, or other suitable contrivance.

A series of reciprocating bars or blades are so arranged and actuated as to pass into the manure in the hopper above the screw and raise or lift the manure, and thus stir and lighten it up before it passes between the threads of the screw or distributor.

A.D. 1873, January 21.—No. 244.

MUIRHEAD, LEWIS POTTER, of the firm of James Muirhead and Sons, nautical instrument makers, of Glasgow, in the county of Lanark, North Britain, and WOOD, ROBERT JAMES, clockmaker, of the same place.—“A new or improved construction of counter or machine for registering the revolutions and speed of engines and other machines.”

This invention consists of six or other number of parallel counting wheels mounted loosely on a stationary spindle, with the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0, equally divided and marked in spaces round their edges or circumference, all much as in other engine counters; but with ten lateral pins in the side of each corresponding to these ten divisions and numerals. These wheels are turned individually by one of a corresponding set of new or improved pallet levers working between each pair of wheels, reciprocated by a pin fixed in their one side, working in an annular groove formed round nine tenths of the web of the advance or actuating wheel, with a V-shaped cam part joining the annular groove, so that as the wheel and cam groove are turned, the V part at every revolution moves the pin and lever out and in, which motion makes the two pallets on its other side turn the wheel behind it by its lateral pin to the extent of one tenth or division, and as the pallets return to their normal position, while the pin is in the annular part of the groove, they lock the wheel between the pin last acted upon and the succeeding one; and this action takes place throughout the whole series of holes, each actuating the other and turning its succeeding wheel a tenth of a revolution for each revolution it makes; the first, while being actuated by its pallet levers, through a connecting link and lever on the first motion spindle, the end of which projects out through the end of the enclosing case, with a lever actuated in the ordinary way by a tappet pin, wire, or other equivalent, connected and moved by the engine, machine, or shaft, whose strokes or revolutions are to be counted or indicated.

A.D. 1873, January 21.—No. 245.

PUCKLE, HENRY JOHN, of Woodcote Green, Epsom, in the county of Surrey, and FENELLY, RICHARD, of No. 122, Cannon Street, in the city of London, merchant.—“Improvements in aerial tramways.”

This Provisional Specification describes the use of a double pannier-like car on a fixed rope.

A.D. 1873, January 21.—No. 246.

NAPIER, JOHN, of 18, Finsbury Circus, in the city of London.—“Improvements in apparatus to be used in lieu of a coffer dam for making excavations under water, and for excluding water for other purposes.”

According to this Provisional Specification a pontoon with an opening in the centre is employed; it has a sharp keel around the opening; it is floated to the place where it is required to be used and allowed to settle down on the bottom. The water is then pumped out of the enclosed space.

A.D. 1873, January 21.—No. 247.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Jean Dedier Digney, Théodore Sebastien Digney, Henry Lartigue, and Henri Forest, all of Paris, in the Republic of France.*)—“Improvements in apparatus for transmitting signals and for opening and closing cocks and valves, which improvements are specially applicable to the prevention of railway accidents.”

This invention relates to a peculiar combination and arrangement of steam whistle and electro magnetic apparatus for transmitting signals, which arrangement is more particularly applicable to locomotive engines on railways for the purpose of warning the driver that any given signal is turned against him in cases where, by reason of fogs, snow storms, or other causes a difficulty exists in seeing the signals along the line, and hence one of the causes of railway accidents, namely, running past a danger signal is obviated.

The said invention is also applicable to the transmission of signals from the bridge to the engine room on board steamers, also from the lower workings or galleries of mines to the surface, also to the opening and closing of cocks or valves for steam, air, or liquid at long distances in large works or manufactories.

A.D. 1873, January 21.—No. 248.

ROBERTSON, JOHN, of Nitshill, in the county of Renfrew, North Britain.—“Improvements in machinery or apparatus for forcing, exhausting, or measuring air, gas, or other fluids or liquids.”

The feature of novelty which constitutes this invention consists in arranging on a shaft or spindle at the interior of a cylinder or casing, one or more rollers or discs provided with slide valves. An opening is formed in the cylinder or casing at one side of the valve or valves, through which the air, gas, or other fluid or liquid passes or is drawn thereinto, and the said air, gas, or other fluid or liquid is, on the rollers or discs being rotated by the shaft or spindle, forced out through another opening situate at the opposite side or sides of the slide valve or valves.

The apparatus may also be employed for measuring air, gas, water, or other fluid or liquid.

A.D. 1873, January 22.—No. 249.

STEAD, JOSEPH, of Ashton-under-Lyne, in the county of Lancaster.—“Improvements in rotatory engines.”

According to this invention, two or more pistons are fitted to revolve within a cylinder around a concentric axis. Each piston is prevented from revolving backwards, and is connected with the shaft by an arrangement of ratchets or clutches which hold when the piston is caused to revolve, but slip when the piston is at rest. When two pistons are employed, they make alternate revolutions, one piston remaining stationary and acting as an abutment during the revolution of the other piston.

A.D. 1873, January 22.—No. 250.

BOOTHROYD, BENJAMIN, of Southport, in the county of Lancaster, venetian blind manufacturer.—“Improvements in the method of and apparatus for sizing and painting laths for venetian blinds and other articles with any kind of liquid colouring.”

The machine consists of a trough of any suitable material, the bottom sloping from the ends to the centre; near the bottom of the trough and about the centre of the same are placed two rollers working on axles; at one end of the trough and in proper relation to the roller are placed sponges or absorbents, so fitted as to allow of adjustment by means of thumb screws. To work the machine, fill the centre of the trough with paint or size; by means of hand power, or applied motive power, pass the tables through the liquid and underneath the rollers through the absorbents, and drawing them therefrom painted or sized.

A.D. 1873, January 22.—No. 251.

ELMSLEY, REMY, of Toronto, Canada, at present residing at Leamington, in the county of Warwick.—“Improvements in electric communication between railway trains in transit and stations or termini, and in the apparatus connected therewith.”

The novelty of the invention consists in maintaining an electric contact between the trains or carriages whilst in transit on railways, and a wire communicating with stations and termini on the line, by means of an adjustable revolving grooved pulley or pulleys running on such wire, and which are connected with a portion of the train by means of an adjustable metallic axle communicating with an electric apparatus in the guard's van.

A.D. 1873, January 22.—No. 252.

FOSTER, BENJAMIN HARDWICK, of Newcastle-on-Tyne, in the county of Northumberland.—“Improvements in the construction of motive power engines driven by steam, compressed air, or other elastic fluid, or by water.”

These improvements relate to steam or other engines in which a piston is made to revolve continuously in a suitable chamber instead of having a reciprocating motion. A hollow cylinder is fitted with ends in which a central shaft revolves. A second cylinder of smaller diameter is fixed to the shaft and has two opposite recesses in its periphery, in which sliding plates or pistons are fitted which are pressed outwards by steam admitted into the recesses through suitable passages. A curved inclined plane is formed between the peripheries of the two cylinders and serves to force each piston into its recess during one half of each revolution. Steam is admitted through a port at the larger end of the inclined plane, and an exhaust port from the outer cylinder is provided at a point nearly opposite to the inlet port.

A.D. 1873, January 22.—No. 253.

KESTERTON, HENRY, of Park Road, Mosely, near Birmingham.—“Improvements in the construction of steam boilers.”

According to this Provisional Specification wrought iron or steel tubes of large diameter are combined together so as to form furnace chambers and flues. The tubes are so held together by clips that the removal of one tube and the substitution of another is easily effected.

A.D. 1873, January 22.—No. 254.

RILEY, EZRA, of Pontnewynydd, in the county of Monmouth, iron works manager, and **HENLEY, WILLIAM THOMAS**, of North Woolwich, in the county of Essex, telegraphic engineer.—“Improvements in puddling furnaces and in apparatus and appliances connected therewith.”

The hearth of furnace consists of a circular revolving iron pan which has a hanging lip or flange all round and dipping into an annular trough constantly supplied with water, thus forming a water lute joint; another hanging lip or flange fastened to the brickwork all round the trough and dipping into it forms a lute between brickwork and trough. A flat air jet may be applied to the surface of the iron. Tools for rabbling, &c., are described. The invention is also applicable to existing furnaces.

A.D. 1873, January 22.—No. 255.

ROSE, HENRY COOPER, of Hampstead, in the county of Middlesex, Doctor of Medicine.—“A new or improved apparatus to be applied to horse-shoes, to prevent horses from falling upon slippery surfaces.”

This apparatus for preventing horses from slipping resembles a horse-shoe divided into two parts, hinged together at the toe, the two heel ends being connected by screw bolt and nut, or any mechanical means by which they may be forced apart or pressed towards each other. It has clamps or catches to secure it over the ordinary shoe, and that surface which comes next the ground when the apparatus is in use is provided with projections or roughing of any kind.

When the clamps or catches are on the inside edge of the apparatus, they are placed under the inside edge of the horse's shoe, and are tightened up by forcing the two heel ends apart; if on the contrary the clamps or catches are on the outer edge, they are placed over the outer edge of the shoe, and sometimes partly up the hoof, and are secured in this position by pressing the heel ends close together.

This apparatus may be carried in a vehicle, or by a horseman, and in case of sudden frost, or when passing over any slippery surface, can be applied in a moment over the horse-shoe, and be as readily removed when roughing is no longer needed.

A.D. 1873, January 22.—No. 256.

NEWTON, WILLIAM EDWARD, of the Office for Patents, 66, Chancery Lane, in the county of Middlesex, civil engineer.—(A communication from John Broughton, of Brooklyn, in the state of New York, United States of America.)—“Improvements in breech-loading fire-arms.”

This invention relates to that description of breech-loading fire arms in which a breech-block is arranged to swing upwards and forwards in opening.

A.D. 1873, January 22.—No. 257.

NEWTON, ALFRED VINCENT, of the Office for Patents, 66, Chancery Lane, in the county of Middlesex, mechanical draughtsman.—(A communication from William Burdon, of Brooklyn, in the state of New York, United States of America.)—“Improvements in apparatus for applying steam to the raising and forcing of water and other liquids.”

This invention relates to the construction and use of what are known as steam vacuum pumps, in which steam is condensed to form a vacuum, into which water is raised by atmospheric pressure, to be discharged either by gravitation or steam pressure on the admission of a fresh discharge of steam.

A.D. 1873, January 22.—No. 258.

GUTENSOHN, ADOLF, of Gresham House, in the city of London, analytical chemist.—“An improved process for obtaining salt of tin and other products from waste or refuse tin-plate.”

I use a vessel made of any material not affected by the action of acids. In this vessel I place the tin plate or refuse with muriatic acid until it has acquired a dull grey colour; the acid is then poured off into a second vessel containing the same weight of tin-plate waste; here it again remains till the colour of the waste is dull grey; after which the same process is repeated in a third vessel. Ammoniac is added until on testing with a solution of extract of indigo a blue black deposit is formed. A further quantity of the solution of extract of indigo is then added until the deposit ceases to be formed. The solution is then allowed to boil for a few minutes, and then filtered. This solution is then evaporated and the salt allowed to crystallize. Metallic tin is obtained from the purified salt of tin by means of zinc.

A.D. 1873, January 22.—No. 259.

HASELTINE, GEORGE, of the “International Patent Office,” Southampton Buildings, London, Doctor of Laws.—(*A communication from Seth Dean, of La Crosse, Wisconsin, United States of America.*)—“An improved method of and apparatus for dressing and furrowing mill-stones.”

This invention relates to an improved method of and apparatus for dressing and furrowing mill-stones, and it consists in the employment of a solid wheel of emery revolving at a high speed for dressing and furrowing the stones, and in a novel apparatus or machine for driving and manipulating the cutter wheel. The object of the said invention is the production of a machine by which mill stones may have their furrows sharpened and the glazing removed from the face expeditiously and in such manner as to leave smooth clean faces and sharp feather edges to the furrows.

A.D. 1873, January 23.—No. 260.

FAIRBURN, ROBERT, of Burley-in-Wharfedale, in the county of York, machine wool combing overlooker.—“Improvements in machinery for washing or scouring wool or other fibres.”

This invention has for its object the rendering light and fleecy and expelling the steam from the fibre delivered by the delivering sheet or “brat” of the machines for washing and scouring wool.

For this purpose I employ a pronged shaft or rake (mounted parallel with and extending across the delivering sheet) upon which the wool or fibre is delivered. A partial rotary motion is given to the shaft by a crank which gives to the prongs or fingers a rapid rising and falling motion tossing or throwing up the wool or fibre which gradually falls off the ends of the prongs of the shaft upon an inclined tray or hopper having a like rapid rising and falling motion. The outer edge or end of this tray is provided with prongs or fingers, and its inclination causes the wool to fall into a receptacle for the removal thereof. The fan motion of the tray or hopper disperses the steam.

A.D. 1873, January 23.—No. 261.

JONES, SAMUEL BRENT, of 15, Clifton Villas, Maida Hill, in the county of Middlesex, coal factor.—“Improvements in railway carriages.”

The fixing at the bottom of each door of carriage a platform, which on the door opening presents a flooring the width of door and twice its width in length, thus bridging over the space between the carriage and the station platform.

A.D. 1873, January 23.—No. 262.

HALFPENNY, GEORGE WILLIAM, of No. 25, Lower Shadwell, in the county of Middlesex, wholesale butcher.—“Improvements in the manufacture of incombustible paper, in ink for writing on the same, and in covers and envelopes for the said paper or other paper when made into books or packages.”

The chief features of novelty in this invention are,—

Firstly, The making of a paper which shall be ordinarily incombustible under such circumstances as fires occurring in dwellinghouses, factories, and other buildings. The paper is composed chiefly of the following

ingredients, namely, linen or vegetable fibre and asbestos with borax and alum, to which is sometimes added a small quantity of ground or powdered glass and of common salt.

Secondly. An ink for writing on the above paper made from the mineral or metallic earths.

Thirdly. Incombustible covers or envelopes for books and packages made from the incombustible pulp or paper with or without sheets of talc or sheets of talc with or without the incombustible paper.

A.D. 1873, January 23.—No. 263.

IRELAND, WILLIAM, of Macclesfield, in the county of Chester.—(*A communication from Richard Pink, of Hoerde, Westphalia.*)—"Improvements in the casting of steel ingots for wheel tyres."

The object of these improvements is to produce tyre ingots of superior quality perfectly clean without rokes or splashes, and of such dimensions and weights as are directly suitable for working up into tyres without cutting or sawing the same from large ingots as heretofore done.

For each ingot there is a cast iron mould of any desired shape, the circular one preferred, which is bored parallel throughout its entire length, the bottom of the mould being fixed to the body screws and having in the centre a hole containing a fire brick with an inlet hole.

Each mould has an adjustable cast iron lid having a central hole for the escape of the gases, the hole being conical in order that the steel which enters should leave freely when the ingot is removed.

The moulds are placed on a plate having in it distributing channels communicating with the moulds and a pit in the centre of the plate, the pit being lined with fire clay, loam, drain pipe, or any suitable refractory material.

The distributing channels can be lined up with fire clay or other refractory material, but the use of burnt fire bricks channelled for the purpose is preferred, the bricks when inserted in their places being coated with a little loam on their sides, bottoms, and ends.

A.D. 1873, January 23.—No. 264.

HALE, EDWARD, and MATTHEWS, CHARLES, both of the Albion Iron Works, Aspull, near Wigan, in the county of Lancaster.—"Improvements in apparatus for rolling iron or other metals."

This invention relates to the rolling of hoop iron or metals similarly shaped, and consists in the construction and employment of self acting mechanical appliances for guiding or conveying a piece or bar of metal between two or more pairs of rolls at the same time instead of one pair, by which means a much greater length of metal can be rolled with the same heat and thereby effect a great economy in labor, an improvement in the quality, and an increased quantity of production.

The heated bar after passing between one pair of rolls passes over a guard to a hinged case balanced by a weight or spring, the case being inclined so that it can lead the rolled strip to another pair of rolls above or below, and so on as often as required.

A.D. 1873, January 23.—No. 265.

FEATHER, SMITH, of Bradford, in the county of York, weaving overlooker.—"Improvements in fire grates."

I construct a bottom grate or series of bars having lugs or projections thereon, these support side irons constructed with a sharp curve from the front part of the grate so as to largely contract the fuel space. I also employ a plate which rests (on its front edge) upon the grate and extending upwards at an angle.

The apparatus is constructed so as to fit together with bolts and fastenings, which allows of its ready removal or application.

A.D. 1873, January 23.—No. 266.

JACOBSEN, FREDERICK, of Redfern House, in the county of Edinburgh.—"Improvements in treating sewage for the purpose of making manure and purifying sewage."

Mixing phosphate of lime along with diluted sulphuric acid, which sulphuric acid is so diluted with sewage instead of with clean water, whereby a superphosphate is produced which is then mixed with the more solid sewage deposit obtained by any of the known methods for producing subsidence and decantation.

A.D. 1873, January 23.—No. 267.

CUMMING, JOHN, of Edinburgh, in the county of Mid Lothian, North Britain, machinist.—"Improvements in apparatus for separating sheets of paper from a pile, and feeding or moving them into or through printing, folding, ruling, embossing, envelope-making, and similar machines."

In one modification the pile of paper rests on a board or plate, which is made to bear it upwards by means of a counterweighted lever or levers; transverse frame pieces confine the front and back edges of the sheets at the top of the pile, and over the front edges there is a series of holding back fingers which prevents the top sheets from taking the next one along with it. The separation of the top sheet is effected by a set of separators shaped like segments of a circle and fixed on a transverse horizontal shaft, to which a reciprocating angular motion is imparted by means of a connecting rod from a crank on a revolving shaft, or in any other convenient way. The segment separators are faced with rubber which is by preference free from sulphur, and is formed with a cellular, grooved, or otherwise indented surface.

An advantageous application of this modification can be made in a ruling machine.

In another modification of sheet separating and feeding or moving apparatus, advantageously applicable where great speed is required, and where the paper is separable with comparative ease, a continuous rotary motion is employed, and the separators consist of a number of narrow strips of rubber on a series of discs or on a drum or cylinder on a revolving shaft. In this case the pile of paper may either be borne up against the separators or it may be stationary, and the separators may be carried by levers or a frame so as to rest with more or less pressure on the pile, and follow it down as it becomes lessened. The reciprocating segment separators may also be arranged to bear on the pile of paper when the latter is on a fixed support, or, what amounts to the same thing, the disc separators may be made to reciprocate instead of revolving continuously.

A frictional pressure is applied by rubber-covered pads to the sides of the pile, which will tend to prevent the top sheet from carrying the next with it.

When the above feeding or moving appliances are used in a ruling machine in which the ruling pens are raised at intervals by cams to limit their action to certain parts of the sheet, a stop operated by a special cam is applied to insure the correct starting of the ruling with each fresh sheet.

A.D. 1873, January 23.—No. 268.

WILLIAMS, HUGH, of Wigan, in the county of Lancaster.—“Improvements in the utilization of the waste heat from coke ovens for the manufacture of soda ash, caustic soda, and for other similar purposes.”

My invention consists principally in arranging two or more coke ovens side by side, in such a manner that their flues unite in one chamber, and charging and working such coke ovens alternately, or in succession, and in employing the heat and gases evolved therefrom in a secondary furnace adjoining the said coke ovens for the manufacture of soda ash, caustic soda, and other similar manufacturing purposes.

A.D. 1873, January 23.—No. 269.

BORLASE, EDWARD, of Redruth, in the county of Cornwall, mining engineer.—“Improvements in the construction of apparatus for separating metals and metallic ores from other substances.”

The main portion of the apparatus consists of circular tables or receptacles, or a series of the same, and which may be either concave or convex, or both, and on to which the substances to be treated are conveyed in a state of slime or sludge, and then subjected to the operation of jets or streams of water, which pass through “distributors.” The tables may be caused to rotate and the “distributors” be stationary, or vice versa. The waste portions of the substances and the metal or ore are respectively carried away by suitable launders or channels.

A.D. 1873, January 23.—No. 270.

FAIRBAIRN, SIR WILLIAM, of Manchester, in the county of Lancaster, Baronet, and BEELEY, THOMAS, of the Hyde Junction Iron Works, Hyde, in the county of Chester, engineer.—“Improvements in steam boilers.”

Our invention is applicable to boilers constructed in the manner described in the Specification of Letters Patent granted to the within-named Sir William Fairbairn on the 18th day of March 1870, No. 810, and it is applicable to stationary and marine boilers.

Our invention consists in the introduction of a multitubular section between the firegrate and the end of the flue, the ends of the tubes being fixed in plates which are connected to the front and back portions of the flue.

A.D. 1873, January 23.—No. 271.

JELLEY, RICHARD SAMUEL CHARLES, and JONES, ROBERT CANNING, of Blackfriars Road, in the county of Surrey.—“An improved tenon cutting machine.”

This invention consists in constructing the fence, so that the timber to be cut shall rest and be guided forward to the cutters through the medium of upright rollers moving in opposite directions to each other, within V slides affixed to the table, actuated by ratchet and lever gear direct from the upward movement of the saw frame.

A.D. 1873, January 23.—No. 272.

SUDLOW, WILLIAM ELI, of Oldham, in the county of Lancaster, engineer.—“Improvements in the construction of steam engines.”

The features of novelty in this invention consist in arranging a series of drums to work in annular casings of larger internal diameter, the annular space in such casings being temporarily divided into two compartments by a slide containing ports and a valve, into one of which compartments the steam pressure is admitted, whilst the other is open to the atmosphere, or is in communication with an air pump and condenser, thus forming a rotary engine as described.

A.D. 1873, January 23.—No. 273.

PITT, ROBERT, of Bath, engineer, and COX, STEPHEN FITCHEW, of Bristol, tanner.—“Improvements in the manufacture of leather, and in apparatus for that purpose.”

In the manufacture of leather the hides are usually submitted to a treatment known as “striking.” According to this Provisional Specification the bed or bed roller employed in this operation is covered with an elastic covering. A roller of galvanised iron is employed in place of wood, and water is applied between the bed roller and the elastic covering.

A.D. 1873, January 23.—No. 274.

PATTERSON, ROBERT HOGARTH, of Hammersmith, in the county of Middlesex, gentleman.—“Improvements in the purification of coal gas, and in the production of alkaline sulphides to be employed for such purpose.”

This invention relates firstly to the production of alkaline sulphides, (to be subsequently employed in the purification of coal gas, either in the manner described in my Patent, dated 9th March 1872, Number 730, or otherwise), by decarbonating impure coal gas, that is gas containing carbonic acid and sulphuretted hydrogen, in alkaline washers or scrubbers or in lime purifiers, in such manner, that while the carbonic acid is arrested in the said washers, scrubbers, or purifiers, sulphuretted hydrogen is driven forward, and converts alkaline substances such as potash or ammonia, ammoniacal liquor, or gas liquor contained in subsequent vessels into sulphides. I also employ the said process for the purpose of more highly sulphuretting gas-liquor, whether decarbonated or not, so as to render the said liquor an efficient material for purifying coal-gas from sulphur contained therein in other forms than that of sulphuretted hydrogen.

This invention relates secondly to a system of purification whereby the elimination of carbonic acid from coal gas is effected by means of lime and alkalies before the said gas is passed through vessels containing alkaline sulphides, either in a solid or in a fluid form, with a view to purify the gas from sulphur contained therein in other forms than sulphuretted hydrogen.

A.D. 1873, January 23.—No. 275.

WATSON, JOHN, of Govan, in the county of Lanark, North Britain, engineer.—“Improvements in operating tramway points and in the means employed therefor.”

The feature of novelty which constitutes this invention is the operating of tramway points from the car platform, and the mechanism for effecting that operation.

A.D. 1873, January 23.—No. 276.

GREY, ERNEST, of South Hill Park, Hampstead Heath, in the county of Middlesex.—“Improvements in increasing the magnifying power of microscopes.”

This invention consists in the use of an additional eye-piece composed of a tube or body with a draw tube or draw-tubes containing two or more lenses, by means of which the magnified image of an object is taken up after it has passed through the eye-piece of the compound microscope and further magnified.

A.D. 1873, January 23.—No. 277.

BROWNE, JOHN COLLIS, of the Cedars, Hampton Wick, in the county of Middlesex, physician.—“Improvements in the construction and arrangement of propeller blades for the propulsion of vessels.”

Propeller blades are arranged upon a shaft, the blades being so shaped that a reverse twist of the screw starts from the boss of each pair, in order that the water which is thrown backwards from the entering blade is received by the back of its neighbouring blade, this being curved to receive it and again act upon it for propelling the vessel.

A.D. 1873, January 23.—No. 278.

CLARK, ALEXANDER, of Rathbone Place, in the county of Middlesex, engineer and revolving shutter manufacturer.—“Improvements in or applicable to corrugated metal revolving shutters and the grooves in which they work.”

I deaden or prevent the noise produced in raising or lowering these shutters, by binding their edges with leather, cloth, webbing, india rubber, or other suitable material, and with the same object I line the grooves in which the shutter works with some soft material glued or otherwise fastened therein. This latter method is chiefly designed to be used in combination with shutters made according to the invention for which I obtained Letters Patent, dated May 2nd 1872, which consists in graduating the size of the corrugations so that when coiled up they will fit on one another.

A.D. 1873, January 23.—No. 279.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London—(*A communication from John Y. Smith, of Pittsburg, Pennsylvania, United States of America.*)—“Improvements in railway brakes, and in apparatus connected therewith.”

This invention relates to that class of brakes for railway carriages in which the power for actuating the brakes is derived from the pressure of the atmosphere acting on the heads of flexible cylinders or chambers in the interior of which a partial vacuum has been created. I use in combination with carriage brakes solid cylindrical heads and a tube of flexible air tight material. I also use chains to sustain the strain. An ejector is placed in the air pipe. An auxilliary air pump operated by the motion of the wheels is used for throwing the pump in gear, in case the train should be divided. In combination with the brakes I use levers and a rod for regulating the pressure. I also employ a rack and pinion and chain for operating the brakes by the compression of the diaphragm.

A.D. 1873, January 24.—No. 280.

BULL, THOMAS, of the town and county of the town of Nottingham.—“Improvements in washing machines.”

This invention consists of a circular or other shaped vessel, with a socket secured on the bottom on the inside to receive a spindle, which carries a disk from which pegs project on the underside; above the disk the spindle is supported by a cross piece, the ends of which are let into recesses in the sides of the vessel; there is a rim on the inside of the vessel below the disk, and ribs extend from said rim to the bottom of the vessel; the spindle is furnished with a handle or handles at the top for driving it, or is supplied with suitable gearing for applying steam or other power.

A.D. 1873, January 24.—No. 281.

HATFULL, ROBERT, of 170, High Street, Deptford, in the county of Kent, chemist.—“Improvements in preventing and removing incrustation in steam boilers.”

This invention consists in the preparation and use of an improved fluid for the purpose of removing the incrustation formed in steam boilers and for preventing the formation of such incrustation.

A.D. 1873, January 24.—No. 282.

HINDS, EDWARD COLTON, 4, Victoria Road, Surbiton, county of Surrey.—“The prevention of accidents on railway station platforms, either by persons standing too near edge, crossing line of rails, opening of carriage doors before the train stops, or getting into carriage after the train is in motion, and in apparatus connected therewith.”

A permanent guard rail about three feet high, near edge of and running the whole length of the station platforms, which rail will sink down instantly on the arrival of a train, in sections, the whole length of train

at that part of the platform at which it stops forming part of platform while the passengers are leaving or entering the carriage. The said rail will instantly rise up when the signal is given for the train to start, which will then prevent any one from entering or leaving the train. This rail will be supported by iron or other rods, hinged at top and bottom, fastened in a groove in floor of platform, and will fall into said groove and be covered by the rail, forming then the floor of platform while required for entering or leaving the carriage. Each section of rail can be elevated instantly by a balance weight at the end of a lever working under platform.

The official whose duty it is will be able to depress or elevate these rails instantly by a crank or handle attached at the opposite side of platform or from signal box, or by other means suitable to the kind and situation of platform.

A.D. 1873, January 24.—No. 283.

JONES, JOB SAMUEL, of the firm of Jones Brothers, of Soho, in the county of Middlesex, roasting jack and coffee roaster manufacturers.—“Improved apparatus or means to be used for basting meat whilst “roasting.”

This invention consists in the application to a roasting screen of a counterbalanced spoon or ladle or such like receptacle, which by motion suitably imparted from an ordinary jack is caused alternately to fall and dip in a well at the rear of the screen in which the gravy or basting fluid accumulates, and to rise filled therewith and deliver it into a suitable perforated or other receptacle above the meat, from which it drips or otherwise falls down on the meat suspended from the jack.

A.D. 1873, January 24.—No. 284.

GIBBS, GEORGE, and PITT, THOMAS, both of the city and county of Bristol, gun manufacturers.—“Improvements in breech-loading fire-arms.”

This consists in connecting a rod or bar which we call a “cocking bar” with the grip lever in the “Lefauchaux” action and a similar “cocking bar” to the bolt of the single, double, or treble bite snap action guns, also applicable to ordinary locks with elongated tumblers; a locking or stop apparatus for locking the hammers at full or half-cock is described.

A.D. 1873, January 24.—No. 285.

TWYNAM, CHARLES HENRY, of 4, Victoria Street, in the city of Westminster, gentleman.—“Improvements in apparatus for working railway signals.”

The chain or cord which is led in the usual manner from the station to the signal is passed round a wheel at any suitable intermediate point. On the same axle as this wheel is a ratchet wheel, into which a paul or catch takes. From this paul a lever leads to a curved piece at the side of the rail. The signal is put at caution or all clear by the attendant at the station pulling the chain or cord, and the parts are retained in this position by the paul. But when a train passes, the curved piece is moved by the flange of the wheels and the paul is thus released from the ratchet teeth, so that the signal is moved to danger by the ordinary weight. The signal may be placed at danger at any time by the attendant pulling another cord attached to the paul. Instead of a ratchet wheel, a plain disc with a hole in its face may be substituted; a rod takes into this hole and is withdrawn therefrom by the action of the passing train.

A.D. 1873, January 24.—No. 286.

CLARK, GEORGE, of No. 10, Craven Buildings, Drury Lane, in the county of Middlesex.—“Improvements in metallic or other vessels used to preserve, cook, or contain articles of food, and partly available for other substances.”

1st. The use and application of a band or ribbon of metal to fasten the covers to vessels used to preserve, cook, or contain articles of food or other substances by soldering or otherwise, so as to close the joint between the vessel and its cover, and hermetically seal the former in and after the manner described or referred to in the Provisional Specification.

2nd. The application of a false bottom perforated with holes and placed at a suitable height above the true bottom of any saucepan or other cooking vessel, so that by this means water being placed under the false bottom on which the articles of food to be cooked rests, any vessel so arranged may be used for the purpose of cooking by steam in lieu of the mode usually practised, which consists of two vessels, one to boil water in to generate steam, the other fixed on the former containing the articles to be steamed.

A.D. 1873, January 24.—No. 287.

BROTHERHOOD, PETER, of No. 15, Elgin Road, Nottinghill, in the county of Middlesex.—“Improvements in applying steam power directly to centrifugal and other rapidly revolving machines, and apparatus therefor.”

This invention relates to means of applying steam power directly to centrifugal and other rapidly revolving machines without the necessity for multiplying gear.

Three steam cylinders are arranged with their axes intersecting at angles of 120° , so that their pistons act on one crank within a cavity containing steam which presses constantly on one side of each piston. The crank drives a rotatory slide by which steam is successively admitted to, and allowed to escape from, each cylinder, whereby continuous rotary motion at high speed is imparted to the crank shaft.

The crank shaft is coupled or attached to the revolving basket of a centrifugal machine, the driving apparatus being placed either under or above the centrifugal machine and arrangements are described for allowing for shake or eccentricity and relieving the weight of the rotating parts.

Similar apparatus is applied to driving other rapidly rotating machines, such as fans, circular saws, threshing machines, rotary pumps and propellers and the like, by extending the driving shaft, so that its extension constitutes the shaft of the machine to be driven; or by connecting the two shafts by any known coupling.

A.D. 1873, January 24.—No. 288.

HUCH, EDWARD HEINSON, of Brunswick, Germany, merchant.—“Improvements of soup-farina.”

This Provisional Specification describes dissolving extract of meat in salt water and adding flour of various kinds.

A.D. 1873, January 24.—No. 289.

GIBSON, GEORGE, and VOWELL, JOSIAS, both of the town of Sunderland, in the county of Durham, engineers.—“Improvements in governors for regulating and controlling the speed of steam and other engines.”

A governor constructed according to our invention consists of a shaft driven by the engine, on which is fastened a spur wheel geared into two racks fixed to weights mounted upon a flywheel which is free to turn upon the shaft. The weights move in guides from the centre of the shaft to the periphery of a fly wheel. A lever is attached to one of the weights which conveys the motion to the valve of the engines. Two springs keep the weights in towards the centre until the centrifugal force on the inertia of the flywheel causes the springs to be overcome. The levers may be attached to the shaft with connecting rods to the weights instead of the spur gear.

A.D. 1873, January 24.—No. 290.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Building, London.—(A communication from Samuel B. Martin and James M. Beath, both of San Francisco, California, United States of America.)—“Improvements in machinery for making ice, cooling liquids, refrigerating rooms, and for other like purposes.”

This invention relates to that class of machines in which cold is continually produced by the vaporization, liquefaction, and return for continuous use of a volatile fluid acting directly on the substance to be frozen without the intervention of a non-congealable liquid. It consists of three parts or divisions, namely, a congealor, compressing pump, and condensor. The aforesaid congealor consists of vertical metallic plates traversed longitudinally by parallel channels in which the volatile liquid flows as it expands. I use a distributor composed of two hemispheres of cast iron bolted together by flanges. The lower half sphere is equally divided into compartments, into the bottom of each of which is inserted one of the pipes composing the congealor. In the centre of this is a vertical shaft, the upper part of which is hollow, as is also the arm extending from it. Into the end of this shaft the liquid is brought by a shaft. The constant revolution of this arm deposits an equal quantity of liquid in each of the compartments or funnels. The condensor is composed of a series of pipes connected with the eduction pipe; they descend spirally as they approach the centre, and then terminate in a hollow cast iron cylindrical ring which forms a receiver for the condensed liquid.

A.D. 1873, January 24.—No. 291.

STEAD, THOMAS, of Birmingham, in the county of Warwick, carpenter.—“Improvements in washing machines, and in washing and wringing machines combined.”

This invention consists in forming a drum of wire or metal, in the shape of two truncated cones joined at their bases, to contain the clothes, and caused to revolve within a trough of water upon spindles at the apex of each cone, raising the drum free of the water by suitable mechanical means; it acts as a wringing machine also, throwing of the water by centrifugal force.

A.D. 1873, January 25.—No. 292.

BAYLEY, JOHN CLOWES, of Attercliffe, near Sheffield, in the county of York, steel and iron manufacturer.—“Improvements in tuyeres.”

The chief points of my invention being,

Instead of using combined fire clay tubes and gannister, I dispense with the combination of material as at present in use and make the tuyere of one solid block of fire-clay, gannister, or other suitable substance, placed, when in a soft pliable state, into a mould of the required dimensions and pierced with air holes of such number and dimensions as will give the desired blast or draught.

It is then baked as hard as an ordinary brick.

A.D. 1873, January 25.—No. 293.

BAILEY, THOMAS THOMPSON, of Padiham, mechanic, and **WADDINGTON, HENRY**, of Burnley, colliery manager, both in the county of Lancaster.—“An improved safety lamp for miners’ use.”

This invention is intended to prevent the possibility of a miner opening his “Davy lamp” without detection, and consists principally in the use of a seal in an enclosed case or box fixed to the lamp, and so arranged that it is impossible for the miner to unscrew the top of his lamp without breaking the seal.

A.D. 1873, January 25.—No. 294.

GRIEVE, TOM WALFORD, of Charles Street, Drury Lane, in the county of Middlesex, artist.—“A new or improved method of locking the joists of stages for theatrical performances.”

This invention consists in locking the joists of a stage by means of grooves on the joists in which run the flanges of cramp-irons, crossing the “sliders,” whereby the mere closing of the “slider” locks the joists; a self-locking arrangement being thus substituted for the ordinary lock-irons placed by hand. The grooves may be on the “sliders” and the tongues on the joists if preferred.

A.D. 1873, January 25.—No. 295.

GEDGE, WILLIAM EDWARD, of No. 11, Wellington Street, Strand, in the county of Middlesex, patent agent.—(A communication from *Auguste Pasquier of Château-Gontier (Mayenne), France, clockmaker*).—“Improvements in chimney and other clocks, for the purpose of alarm.”

This invention consists in a particular arrangement of clockwork, and of an alarm movement below it, this latter being quite independent of the clockwork, and set in motion by the fall of a weight from the clock.

There are two dial plates to the clock, a main dial and a smaller alarm dial; a “snail” or eccentric turning with the smaller dial starts the weight when its notch or recess comes opposite the No. 12 of the main dial. The alarm is set by bringing the No. 12 of the alarm dial opposite the hour on the main dial at which it is desired to start the alarm; for example, if the No. 12 of the alarm dial is placed opposite the No. 6 of the main dial, the No. 6 of the alarm dial will be at No. 12 of the main dial, and six hours afterwards the notch of the “snail” will have started the alarm, because the No. 12 of the alarm dial will have reached the No. 12 of the main dial, and so on for any other hour, always without any interference with the hands of the clock. When the weight falls, it strikes a spring which releases a small lever and ratchet wheel, permits a barrel arbor to revolve, and a hammer to strike the alarm bell until the spring power is exhausted.

A.D. 1873, January 25.—No. 296.

SCOTT, HENRY YOUNG DARRACOTT, of Ealing, in the county of Middlesex, Major General, C.B.—“An improved mode of or process for obtaining fertilizing substances.”

The object of this invention is the manufacture of precipitated phosphates by the addition to clarified sewage water of impure phosphatic substances such as coprolites dissolved in acid.

A.D. 1873, January 25.—No. 297.

VAUGHAN, EDWARD PRIMEROSE HOWARD, F.C.S., of 54, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from Joseph Hemingway and William Rainbow, both of Bombay, in the East Indies.*)—"Improvements in the construction of keys for securing the rails of railways."

This invention consists, firstly, in the construction of "double keys." The key is formed of two pieces of cast iron or other suitable material, each of the pieces being provided with a shoulder on its inner face, which butt against each other when the two pieces are placed between the rail and the arm or lug of the chair. A cushion of wood or other suitable substance is, if desired, inserted in a recess in that piece which is nearest the rail. A tapered wedge of iron or other suitable material is then driven into a tapered groove formed longitudinally in the inner faces of the two pieces which form the key, and the requisite degree of tightness thus attained. The wedge is provided with a number of holes formed therein, and a split pin or cotter is passed through the hole nearest the key, thus preventing the wedge from becoming loose. A projection is formed on the outer face of that part of the key which is nearest the arm or lug of the chair, and which projection overlaps the side of the arm and affords additional security.

The second part of this invention relates to "single keys." The key is formed of a tapered piece of iron or other suitable material, having a bevilled groove on one face thereof. A cushion of wood or other suitable material may be inserted in a recess formed in the other face of the key. The key is inserted between the rail and the arm or lug of the chair, with the cushion bearing against the former and the bevilled groove facing the latter. A key similar to that before described is driven into the bevilled groove, thus pressing the key tightly against the rail, a split pin or cotter being then inserted into one of the holes in the wedge.

A.D. 1873, January 25.—No. 298.

LONGWORTH, THOMAS, of Blackburn, in the county of Lancaster, cotton manufacturer, and JONES, FRANCES LLOYD, of Blackburn aforesaid, mill manager.—"Improvements in looms for weaving."

For the purpose of producing the figured or fancy bordering on cotton pieces, which heretofore has been produced by the action of the "dobbie" or similar apparatus, we mount behind or near to the "heald shaft" a shaft having thereon a number of discs; in one face of each is a tappet; these tappet discs slide on the shaft to a collar, against which they are held by means of a nut on the shaft, a portion of which is chased or screwed for the purpose. Tappet levers rest between the discs on the tappets, and the healds for operating the border warp are connected with these levers in the ordinary manner, and rotation is imparted to the disc, tappet shaft, and tappets by means of a lever catch and catch-wheel.

A.D. 1873, January 25.—No. 299.

TESTER, JAMES, of Hurst Green, in the county of Sussex.—"Improvements in machinery for cutting "chaff and other similar vegetable substances."

The novelty of the invention consists in applying and adapting to the chaff cutting machine a novel arrangement of feed motion, actuated by an eccentric on the driving shaft, and also in giving to the "pinch blocks" holding the material whilst being cut, an action independent from that of the feed rollers.

A.D. 1873, January 25.—No. 300.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from S. G. Corliss, of the city and state of New York, United States of America.*)—"Improvements in clothes-wringers, parts of which improvements are applicable to other apparatus or "machinery."

The first part of this invention relates to the construction and arrangement of gearing, by which motion is communicated from one roller to another, whereby the rollers may be separated from each other a considerable distance without disengagement of the gearing. The second part of the said invention relates to connecting the rollers to a spring acting to resist their separation by means of a strong iron link at each end of the machine, whereby the force applied to separate the rollers is taken by the said links.

A.D. 1873, January 25.—No. 301.

DENNIS, WILLIAM, of Holborn, in the city of London.—"Improvements in apparatus for forcing and "discharging water, air, and other fluids and gases, for extinguishing fires, and for other useful purposes."

This invention relates first to improvements in apparatus such as was described in the Specifications of Letters Patent granted to William Henry Phillips, dated 5th October 1865, No. 2559, and 22nd March 1869, No. 858, and also to John Scott, dated 31st May 1867, No. 1614, each of which described similar portable apparatus for the purpose of extinguishing fires by means of vessels containing water and charged with compressed air.

The first part of these improvements has for its object the application of a safety valve to the vessel or chamber containing water and compressed air or gases, so constructed that the air and water is allowed to escape through the valve when the pressure within the vessel arrives at a determined pressure.

The second part of these improvements relates to the method of arranging the inlet valves of fire extinguishing apparatus of this character.

According to these improvements the valve is surrounded with a cover or cap so that the back pressure is prevented from acting upon the valve to prevent its closing. Or the same object is effected by means of a duplicate valve.

The third part of these improvements consists in attaching the nozzle of the discharge pipe to a series of "director tubes" which are combined together into one length by screw sockets or other suitable couplings.

Director rods or tubes of this character may also be employed in accordance with this invention for cleaning windows or the exterior of buildings or edifices, soap, soda, or other suitable chemical solutions being employed and discharged therefrom for these purposes.

Several discharge tubes and nozzles may be combined together for discharging a number of jets simultaneously for washing and cleaning purposes.

According to another part of these improvements apparatus of this character is employed for forcing currents of air, gas, or other fluids or liquids through pipes or passages for illuminating, signalling, purifying, disinfecting, impregnating, and other useful purposes.

A.D. 1873, January 25.—No. 302.

COXETER, JAMES, of 23 and 24 Grafton Street East, London, W.C., surgical instrument maker.—
"Improvements in apparatus for administering nitrous oxide gas previous to surgical or dental operations."

Passing nitrous oxide gas through pipes into and out of a bell charged with water, and placed in an ordinary gasometer, and using an intermediate apparatus containing such a bell and pipes between an ordinary gasometer, and the usual administering apparatus.

A.D. 1873, January 25.—No. 303.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws.—(*A communication from Frederick Warren Nichols, of Lynn, Massachusetts, United States of America.*)
—"Improvements in hinges and in their application to folding desks, and in the construction of such desks."

The first part of the said invention consists in a self supporting hinge, one portion of which is secured to the under side of a desk or other article of furniture or to the side of a room, and the other portion to an auxiliary leaf or shelf to be raised when required for use. The second part of the said invention consists in the application of the said improved hinge to a folding desk, and in the construction of the desk frame to receive the ends of the front of a book rack.

A.D. 1873, January 25.—No. 304.

DE WARE, ARTHUR AUGUSTUS, of Notting Hill, in the county of Middlesex.—"Improvements in umbrella and parasol frames."

I make the top notch and the notch on the runner of thin metal bent into the required form, and attach the ribs and stretchers thereto by a sort of ball and socket joint, without any tying in wire, by forming knobs on the ends of the ribs and stretchers, which are received in a hollow bead formed round the notch. Radial slits are cut in this bead for the reception of the ribs or stretchers, which are slightly flattened so as to form a kind of neck beneath the knob or head, the ribs and stretchers being inserted therein before the notches are placed on the stick, which serves to retain them in place.

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A.D. 1873, January 25.—No. 305.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from the firm of Coignet, Son, and Company, of Paris, in the Republic of France.*)—"Improvements in the torrefaction of animal substances for the purpose of manufacturing manure therefrom, and in the apparatus or means employed therein."

This invention consists in torrefying animal solid and liquid substances by the direct contact therewith in closed chambers of gases superheated to a temperature of about 550 degrees Fahrenheit. Also in first drying the substances by the direct contact of gases heated to about 330 degrees Fahrenheit, and then torrefying as above described. Also in cooling the torrefying mass by the application thereto of jets of water or saline solutions.

A.D. 1873, January 25.—No. 306.

MIDDLEMASS, JAMES, of Edinburgh, in the county of Mid-Lothian, North Britain.—"Improvements in clerical costume."

The feature of novelty which constitutes this invention is the combining of the pulpit-gown with a coat or cassock, the two being connected together at the shoulders and back or upper part, or they may be made separate by making the gown with double sleeves.

A.D. 1873, January 25.—No. 307.

BURGESS, JOHN, of the firm of John Burgess and Sons, of Birmingham, in the county of Warwick, manufacturers.—"Improvements in metallic handles for crochet needles, and in fastening or connecting crochet needles to their handles."

According to this invention, a handle is made by cutting a taper blank from sheet metal and forming channels or semi circular depressions along the middle of the blank and situated alternately on opposite sides of the blank; or forming a continuous trough or channel along the middle of the blank. The narrow end of the handle has an elastic tubular nose and the head of the handle is prolonged at its middle or has a tubular part, the said prolonged or tubular part at the head being pierced with a hole. The needle has an eye or hole in its head, and is passed down the central channel or channels of the handle and through the tubular nose. A ring or rivet being passed through the holes in the needle and projecting part of the head of the handle the needle is fastened very securely to the handle, the central channel or channels and tubular part or parts described giving great steadiness to the needle. The improvements described are applicable to handles having a cylindrical, flat, oval, or other figure in cross section.

A.D. 1873, January 25.—No. 308.

WIGHTMAN, ARTHUR, of Bank Chambers, George Street, Sheffield, in the county of York, gentleman.—"Improvements in horse shoes."

This invention consists in making horse shoes in two parts.

The upper part is nailed to the horse's hoof, and the lower part is formed with hooks and a lug or lugs, by means of which it is readily affixed to the upper part. Projections are made on the said lower part to prevent the horse from slipping.

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Abridgments open to public inspection before the expiration of the term of six months (in consequence of the Patentees having filed their Final Specifications), and also the Abridgments of Complete Specifications received from July 19 to July 25, 1873. These Abridgments will be subsequently printed in the body of the book, in order to preserve the numerical and chronological arrangement.

A.D. 1873, January 27.—No. 313.

THEAKER, HENRY, and OSBORN, SAMUEL, both of Sheffield, in the county of York.—“Improvements in apparatus for forging or shaping metals.”

In carrying out the invention any convenient form of direct-acting or tilt-hammer may be used, but instead of the ordinary anvil there is substituted a movable roller or anvil capable of turning round on an axis transverse to the line of motion of the hammer. Or the anvil may be in an approximately segmental form and turn through part of a circle. The bottom of the anvil is supported by a concave seat on an anvil bed. The anvil is grooved or indented to correspond with the shape to which the article is to be forged, or separate indented pieces may be fixed on the anvil for that purpose. Provision is made for turning the anvil gradually between the strokes of the hammer by a ratchet wheel actuated by a pawl and lever from the head of the hammer.

A.D. 1873, January 27.—No. 314.

GIRDWOOD, ROBERT, of Edinburgh, in the county of Mid Lothian, North Britain.—“An improved portable apparatus for illuminating by means of gas.”

One improved appliance consists of a short metal tube fitted with a burner and with a clip by means of which it can be easily fixed on any article whilst the gas is supplied to it by flexible tubing. A clip or portable bracket may be used with two burners or the burner tube or bracket may be attached to the frame or stand of a looking-glass leaving only the flexible tube as the detachable part.

A.D. 1873, January 27.—No. 316.

KOLB, ADOLPH, of No. 1, Circus Place, Finsbury, in the county of Middlesex, and ALLSOP, COLERIDGE, of Old Broad Street, in the city of London.—“Improved means of rendering closets and other places inodorous, and in the arrangements of appliances for the purpose.”

This relates mainly to double pipes merging into one for removing smell and foul gases from an enclosed receiver into which the excreta is free to fall.

A.D. 1873, January 27.—No. 317.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Pedro Marquez, of Paris, France.*)—“Improvements in breakwaters.”

I may construct the breakwater of various materials. It may have air chambers and ballast or may be built of wood with iron ties. If calculated for waves rising twelve feet from their natural level it should have an elevation of thirty feet and a proportionate width to give it the required stability. It has a number of stays, which are the most numerous at the extremities where the greatest strain is borne. Curved supports are extended from end to end of the structure to prevent the deflection of the heads. Floats are employed at the front of the structure and properly secured by chains in combination with two series of anchors.

A.D. 1873, January 27.—No. 319.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Robert Edwin Dietz, of the city, county and state of New York, United States of America.*)—“An improved self setting animal trap.”

[No. 4.—APP.]

(E)

The object of this invention is to catch a number of animals successively in a single trap, and this object is accomplished by constructing the trap so that each animal, when caught, shall, in passing from a dark into a light compartment, in its efforts to escape re-set the trap.

A.D. 1873, January 28.—No. 330.

GIBBS, HENRY HYNE, of Stroud, in the county of Gloucester, manufacturer.—“Improvements in the manufacture of driving straps or bands.”

According to this invention driving straps or bands are made by taking pieces of leather having a rhombic figure, and placing them side by side so that their longer sides are in contact and their short ends in the same right lines. The longer sides of the rhombic pieces being sewn together a band or strap is formed, the junctions of the pieces of leather crossing the band obliquely. The outer edges of the band may be protected by straight or longitudinal strips of leather. Double or compound bands may be made by using two or more of the bands or layers described, the said layers being so arranged that the junctions of the pieces of one layer cross the junctions of the pieces of the other layers, and the two or more layers are cemented and pegged together, and for additional strength are stitched together.

The cement between the layers may be dispensed with, and the pieces of leather may be rectangular and their junctions cross the band at right angles.

A.D. 1873, January 28.—No. 336.

SOKOLNICKI, JOSEPH, of Clinchon, near Castillon (France).—“Improvements in lamps and apparatus for burning mineral oils or other inflammable liquids.”

This invention consists in combining with the burner of the various forms and arrangements of lamps an evaporating tube, for the purpose of keeping up the supply of vapour from the mineral oils or essences or other inflammable liquids, and thereby prevent the light from becoming small or extinct.

A.D. 1873, January 28.—No. 339.

WITTIG, ROBERT, of Chemnitz, in the Kingdom of Saxony, Germany, engineer.—“Improvement in dividing apparatuses on carding machines.”

This relates to a method of arranging the dividing apparatus upon wool combing machines, and to appliances for retaining the necessary tension upon the fleece during the division.

A.D. 1873, January 29.—No. 346.

MIDDLEHURST, JOHN, of 56, Tillotson Street, in the township of West Derby, and borough of Liverpool, in the county of Lancaster, plumber, and MIDDLEHURST, JAMES, of the township of Rainford, in the county of Lancaster, brewer's clerk.—“An improvement by mechanical means of the process of the ingathering of the potato crop and other roots, and at the same time cleansing the roots so gathered from the adhering soil, and depositing them in hampers or other receivers for ready storing.”

Our invention is an agricultural implement intending a mechanical means of gathering all descriptions of roots, chiefly the potato, and cleansing them in the process of gathering. The fore part of the implement is a share or cutter passing through the soil below the roots. The soil and roots pass upon a grating, the whole carried onward by prongs or forks moved by the carrying wheels of the implement. In the motion and progress the soil falls between the bars to the ground. On attaining the end of the grating, the roots fall into a vibrating riddle, where the cleansing is finished, and they are then deposited in hampers, or by a shoot directed as desired upon the ground.

The implement will be valuable also as a cultivator, turning up the soil, opening it to the atmosphere, pulverising it, and cleansing it from stones and weeds.

A.D. 1873, January 29.—No. 347.

YOUNG, GEORGE, of Grangemouth, in the county of Stirling, North Britain.—“Improvements in lamp lanterns and in the lenses used therein, the same being also applicable to lighthouses.”

The features of novelty which constitute this invention are, the arrangement for supplying air to the interiors of the lanterns and the obscuring of the lenses.

A.D. 1873, January 29.—No. 352.

SMITH, SPENCER, of No. 204, High Holborn, in the county of Middlesex, engineer.—“Improvements in apparatus for shewing the number of passengers by public or other conveyances, and for enabling the amounts of their fares to be checked, which apparatus is applicable also for checking the attendances of workmen and others at workshops and other places.”

This invention is designed to guard against fraud upon employers of money takers or workpeople by the use of counters or other tokens in conjunction with apparatus provided with chambers and receptacles.

The apparatus is constructed with a series of store-tubes, chambers, or places for unused counters or tokens and a separate series of receptacles for such as may be withdrawn. Each store-tube or chamber is provided with a bottom slide or tray recessed to receive and draw out the counters or tokens one at a time, as may be required. The receptacles are opened and closed as required by a slotted closing shaft connected by a link to a slotted check shaft for governing the operation of the trays or slides.

In some cases an upper and a lower slide suitably slotted and suitably connected may be employed so as to operate together in lieu of the closing shaft or plug, and check bar or locking shaft above mentioned.

A.D. 1873, January 30.—No. 368.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from Louis Laurette, of Paris, France.*)—“Improvements in the manufacture of artificial stone for building and other purposes.”

I make blocks for building purposes, tiles, and fire bricks from blast furnace slag which is first reduced to a coarse sand and then to powder or sifted and afterwards mixed with suitable binding materials, such as hydraulic or other lime or cement.

The materials thus mixed are then pressed, while moist, into the form desired, and when hard may be cut, sawn, turned, or carved.

By adding coloring matters artificial marbles and variegated stones may be produced.

A.D. 1873, February 1.—No. 396.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from James Parkyn, of Montreal, Canada.*)—“Improvements in machinery for separating the dust, bran, and germs from the granular portions of wheat.”

This invention has reference to improvements in that class of machines used for separating the dust, bran, and germ of the wheat from the granulated portions known as “middlings.” It is designed to provide a better and more equally distributed current of air, and one capable of adjustment, thereby increasing the quantity and quality of the work done by the machine. It also provides a brush for acting on the bolting cloth in a more simple and efficient manner than those at present in use.

A.D. 1873, February 3.—No. 402.

THORNELOE, JAMES, of Birmingham, in the county of Warwick, joiner.—“Improvements in organs and harmoniums.”

According to this invention, the rows of keys are arranged nearly in the same plane, so that the performer can perform with one hand partly on one row of keys and partly on another.

Arrangements are described for coupling either row of keys to the one row or all the rows of keys below it—also for coupling a row of keys with the row next above it—also for coupling the upper of three or more rows to the lower row—or the reverse—also for coupling the keys of any row with the octave higher or lower of the same row or of a different row. The pallets are opened by the agency of electricity. They are also constructed with a parallel motion instead of a hinge joint and are lifted from their seats by a knee or toggle joint. They are also made compound to diminish the resistance to their opening. The sound board is so constructed that the pipes, upper board, slider and portion of table appertaining to any stop may be removed without disturbing the remainder. The swell is constructed of two sets of shutters mounted on opposite ends of a beam, so that the shutters are balanced in every position. The whole of the parts of any one series (except the pipes) are made of one uniform size, so as to make them replaceable and capable of being made to a great extent by machinery.

A.D. 1873, February 10.—No. 483.

MILBURN, JOSEPH, of Marlborough, in the county of Wilts, ironmonger.—“Improvements in chimney cowl.”

This invention relates to a peculiar noiseless revolving chimney cowl for curing smoky chimneys, and consists in enclosing the flint or other hard bearing surface which supports the spindle carrying the cowl in any good non conductor of sound, such for example as leather or preparations of india rubber.

The box containing the flint and non conductor of sound is rendered fire proof by having all its joints rivetted together.

This box is contained in the bottom of a copper oil box which is so elevated as to bring its lower end about level with the top of the chimney shaft, thus affording greater facility for sweeping the same.

This box is also made fire proof by being rivetted together, and is supported on angular brackets attached to the shaft, a non conductor of sound such as leather being interposed between the brackets and the shaft.

Within the oil box there is fitted a spindle box which rests upon a collar on the flint box and has openings in the top and bottom for the spindle to work in, other openings being provided for the passage of oil through both ends of the said spindle box. Collars of leather or other non conductors of sound are fixed to the top and bottom of the spindle box at the parts where it comes in contact with the spindle. Another collar is also fitted to the upper part of the spindle underneath the cap or cover of the oil box to prevent the spindle from being accidentally lifted out of its place by the wind. The top of the spindle carries three arms radiating from the spindle, forming a species of framing to which the cowl head is secured in lieu of having only two arms straight across.

Radiating fans increasing in depth towards their outer ends are fixed onto the head of the cowl in lieu of being cut out of the same, so that in my cowl there are no openings in the head for the entrance of down draught. These fans are stayed by means of a ring of wire, and the louvres at the sides are similarly stayed both at the top and bottom ends.

A.D. 1873, February 11.—No. 505.

DEACON, HENRY, of Appleton House, Widnes, in the county of Lancaster, alkali manufacturer.—“Improvements in the manufacture of chlorine.”

This invention relates to improvements upon Deacon's chlorine process, and consists in mixing the active substance or substances employed with one or more substances of another class which when used alone are inactive or inert, that is, do not possess the power of decomposing heated hydrochloric acid gas and air or oxygen in any material degree, but when mixed with the sulphate of copper, *ceteris paribus*, materially increase its activity in this respect. Sulphate of soda and sulphate of potash are types of this class of inactive but, so to say, accelerating substances.

A.D. 1873, February 12.—No. 515.

BROAD, JOHN, of Hornsey Rise, Islington, in the county of Middlesex, chemist.—“An improved case or bag for applying poultices and other external applications to various parts of the human body.”

This case or bag is composed of a waterproof cloth back (or other material similar) and a muslin, lawn, or other like fabric in the front, the poultice being introduced between.

It prevents leakage and evaporation, and is expeditious and cleanly in application.

A.D. 1873, March 6.—No. 817.

RYLANDS, JOHN, of Warrington, in the county of Lancaster, wire manufacturer.—“Improvements in machinery for straightening, measuring, and cutting wire and rods of metal.”

My improved machinery consists of a pair of rollers between which the wire or rod of metal passes; the lower roller is driven by steam or other power and the top roller is held in contact with the lower roller by a weighted lever. To the lower roller or upon a shaft in communication with it is fixed an adjustable cam or tappet which can be set so as to act on the weighted lever at any time, and the same or another cam or tappet is connected by a lever and rod or otherwise to a cutter by which the wire or rod is cut off.

A.D. 1873, April 19.—No. 1428.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from William Helme Ireland Howe, of New York city, United States of America.*)—“An improvement in cans for preserving fruits and other substances.”

The improvement consists in providing a can for preserving fruits and other substances with a top of tin foil placed beneath the cover for closing the contents air tight.

A.D. 1873, May 7.—No. 1645.

HENDERSON, ARTHUR CHARLES, of the firm of Henderson and Company, British and Foreign patent agents, of No. 6, Southampton Buildings, Chancery Lane, in the county of Middlesex.—(*A communication from Thomas Leonard Barber Edgecome, of New York city, New York, in the United States of America.*)—"Improvements in fettling for puddling and boiling furnaces, and in the mode of application thereof."

The improved fettling or fixing is suitable to all kinds of puddling or boiling furnaces for manufacturing iron or steel, no matter what the method of puddling.

The preparation is formed of sand or sandstone, such for instance, as is employed for firestone and as hearthstone in blast furnaces; this is reduced and pulverized in a pan with revolving wheels or by any other suitable method, and is mixed with a sufficient quantity of water or other liquid to form it into the consistency of mortar, and the substance thus obtained is applied in a moist state or mortar like condition round the inside of the furnace, against the bridge, back, and jamb chills, to protect such parts and prevent their contact with the iron and from being injured by the intense heat, whilst at the same time it nourishes the charge.

The moist fettling dries naturally in the furnace by the heat thereof, and is readily hardened by such heat by the time that the charge in the furnace is ready for puddling.

The advantages of the employment of this new preparation for fettling furnaces are most important, as a furnace fettled therewith may be charged several times, whereas if iron ore or quartz be used (the old method) for each charge a fresh fettling is required.

The cost of the new preparation is $\frac{1}{3}$ of a ton less than the old and gives better results, rail iron equal to bessemer rail costing 20 shillings less than common rail.

A.D. 1873, July 19.—No. 2481.

VAUGHAN, EDWARD PRIMEROSE HOWARD, F.C.S., of 54, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from F. W. Lurmann, residing at Osnabruck, Prussia, in the Empire of Germany, and C. W. Aldendorff, residing at Duisburg, Prussia, in the said Empire.*)—"Improvements in the construction of tuyeres or nozzles for blast furnaces, and in the mode of fixing the same."

The tuyeres are by preference formed of the alloy known as phosphor bronze, and are made open at the larger end for the purpose of allowing the interior to be readily cleansed. The end is closed with a properly fitting cover, the fastenings of which are so arranged that the tuyere can be turned 90°, 180°, or 275°, and thus expose the whole of the exterior thereof to equal wear. By preference each tuyere is fixed in a cast iron frame in which water is allowed to circulate.

A.D. 1873, July 22.—No. 2504.

SAULT, JOHN, of South Manchester, in the county of Hartford, state of Connecticut, in the United States of America.—"A certain new and useful machine for spreading silk."

The object of this invention is to properly supply waste silk to the drawing rolls with less labor than heretofore.

Instead of whipping or beating the fibre by hand and supplying it to the feeding apron in small handfuls requiring careful arrangement to match the ends of the fibre properly together and to distribute the mass over the breadth of the feeding apron, this invention requires simply that the masses of fibre as they came from the dressing room in the ordinary condition, vizt., in what are technically termed "books" shall be laid directly by a single operation on a supplementary feeding apron.

A.D. 1873, July 24.—No. 2527.

ST. JOHN, WILLIAM HENRY, of New York, in the county and state of New York, United States of North America.—"Improvements in processes for purifying illuminating gas, and apparatus therefor."

The invention relates to the purification of illuminating gas produced by distillation from bituminous coal, oils, rosin, and similar materials. It is designed to effect such purification without the use of any water whatever, other than that evolved from the coal or other gas-producing substance while being distilled, to dispense wholly or for the most part with the usual purification by means of lime or oxyd of iron; and to secure, practically, a larger quantity of gas from a given weight of coal than is possible with the gas-making methods and operations hitherto in use.

To secure these results the invention consists in a novel process of purifying the gas by causing it to come in intimate contact, in a chamber separate from the main, with the condensed products brought over from

the retorts during distillation, this aqueous liquid absorbing the ammonia from the gas, and fixing the same by means of the acids held in solution, or absorbed from the gas by the said liquid, the tar particles being meanwhile caused to agglomerate in the liquid, so that a perfect purification of the gas is secured without the usual washing or other expensive or deteriorating process or operation. The invention also comprises a chamber (distinct from the main, which receives the gas from the retorts), constructed with a horizontal partition provided with depending dip-tubes, and with its upper and lower parts connecting by pipes with the aforesaid main; the whole arranged to conduct the gas from the main and cause it to be passed through the liquids evolved from the gas-producing material to effect the purification of the gas as herein-before set forth. The invention also comprises the combination with the aforesaid purifying chamber, of a secondary chamber or tank wherein any moisture that may have been carried over, in, or by the gas from the purifying chamber is condensed, previous to the passage of the gas to the gasometer or receiver. The invention also comprises certain mechanical means for insuring the passage of the illuminating gas through the purifying apparatus, and for regulating the sealing of the dip-tubes, through and from which the gas passes into the liquid evolved from the gas producing material.

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 Clure, W. B. Mc, 13, Cart saddles.
 Cochrane, H., 1187 (*App. 40.*) Knives and forks.
 Cocker, J., 1084 (*App. 1.*) Spinning.
 Codd, H., 75, Bottles; 221, Tramways.
 Coignet, Son and Co., 305, Manure.
 Cole, F., 110, Air-engines.
 Conder, E., 32, Mechanical motive-power.
 Cookerly, M., 459 (*App. 33.*) Hoes.
 Cooper, J., 16, Casting metals.
 Corliss, S. G., 300, Clothes wringers.
 Coubro, T. P., 185, Ships' sails.
 Coulter, J., 159, Governors.
 Cowles, E., 99, Cooling candle moulds.
 Cowper, E. A., 131, Sewing boots and shoes.
 Cox, J., 214, Extracting and recovering oils, fats, &c.
 Cox, S., 214, Extracting and recovering oils, fats, &c.
 Cox, S. F., 273, Leather.
 Coxeter, J., 302, Administering nitrous oxide gas.
 Craven, T. C., 22, Ginning cotton.
 Crispin, W. H., 122, Furnaces.
 Croll, A. A., 45, Distilling liquors, &c.
 Cumming, J., 267, Feeding paper to printing and
 other machines.
 Curtis, F., 769 (*App. 36.*) Paper-making; 1924
 (*App. 48.*) Steam-boilers and engines; 2238
 (*App. 52.*) Sewing boots and shoes; 2389 (*App.*
 2.) Cutting precious stones.
 Cutter, J. M., 1646 (*App. 45.*) Valves.

D.

Davies, R. V., 210, Water waste preventers.
 Davis, G., 162, Ships' davits.
 Davis, J., 2353 (*App. 2.*) Tanning.
 De Chodzko, N. F. B., 124 Steam-boilers.
 De Kercado, G. T., 104 Water meters.
 De Ware, A. A., 304, Umbrella and parasol frames.
 Deacon, H., 505 (*App. 4.*) Chlorine.
 Dean, G. W., 355 (*App. 31.*) Sifting shovels.
 Dean, S., 259, Dressing mill-stones.
 Decastro, D., 12, Wet gas meters.
 Delessert, H. E., 157, Carriages.
 Demailly, G., 1644 (*App. 45.*) Hydro-caloric mo-
 tors.
 Den Bergh, J. Van, 8, Harness.
 Denby, W. S., 192, Gully traps.
 Dennis, W., 301, Fire extinguishers, &c.
 Deregnaucourt, A., 103, Boots and shoes.
 Dietz, R. E., 319 (*App. 4.*) Self setting animal traps.
 Digney, J. D., 247, Signals.
 Digney, T. S., 247, Signals.
 Dixon, J., 222, Bridges and viaducts.
 Dodge, T. A., 1901 (*App. 48.*) Hydraulic hose.
 Donisthorpe, R. F., 108, Crimping hair.
 Donoghue, J. D. O', 2420 (*App. 3.*) Tooth brushes.
 Donoghue, W. O', 2420 (*App. 3.*) Tooth brushes.
 Dougherty, W., 932 (*App. 37.*) Casting metals.
 Doury, P., 89, —Waterwheels.
 Drummond, D., 6, Casting metals.
 Du Bois, C., 1250 (*App. 40.*) Elevating apparatus.
 Ducomet, J., 2377 (*App. 2.*) Nets.
 Duffee, E., 1575 (*App. 44.*) Gas.
 Dupuch, G. J., 33, Water gauges.

E.

Eaton, R., 26, Grinding corn.
 Eayrs, W. P., 2354 (*App. 2.*) Rotary engines.
 Edgcome, T. L. B., 1645 (*App. 4.*) Fetting furnaces.
 Edwards, G. W. B., 243, Manure drills.
 Eickemeyer, R., 76, Hats.
 Elmslie, E. W., 211, Opening cases, boxes and cans.
 Elmsley, R., 251, Railway signals.
 Emmens, S. H., 2108 (*App. 51.*) Signals.
 Erskine, F., 192, Gully traps.
 Evans, W. N., 14, Tanning.
 Evans, W. R., 2261 (*App. 1.*) Fire-arms.

F.

Fairbairn, R., 260, Washing fibres.
 Fairbairn, Sir W., 270, Steam-boilers.
 Farrow, C., 218, Bottle stoppers.
 Fawcett, T., 159, Governors.
 Fay, W. C., 1101 (*App. 39.*) Fibres.
 Feather, S., 265, Fire-places.
 Fennelly, R., 245, Aërial tramways.
 Fenn, A. G., 56, Signals.
 Field, C. M., 2389 (*App. 2.*) Cutting precious stones.
 Fisher, R. A., 2435 (*App. 3.*) Preserving iron and
 steel.

Fisk, F., 1584 (*App. 44.*) Printing telegraphs.
 Folk, J. E., 19, Dies.
 Forest, H., 247, Signals.
 Forrest, H. E., 610 (*App. 34.*) Turning axles.
 Foster, B. H., 252, Steam and other engines.
 Foulis, W., 59, Charging and drawing retorts.
 Fowler, H., 77, Hospital beds.
 Freeman, H. O., 980 (*App. 38.*) Cheese.
 Fuller, T., 161, Billiard cues.

G.

Gardiner, P. G., 37, Springs.
 Garon, F., 62, Stoves.
 Garth, R. F., 145, Treating hides, cotton waste and seeds.
 Gay, P., 95, Excavating minerals.
 Gedge, W. E., 104, Water meters; 202, Cocks and vent pegs; 295, clocks.
 Gense, C., 130, Mattresses.
 George, C., 224, Barometers.
 Gibbs, G., 284, Fire-arms.
 Gibbs, H. H., 330 (*App. 4.*) Driving straps and bands.
 Gibson, G., 289, Governors.
 Gibson, R. H., 119, Desks and seats.
 Gilbee, W. A., 564 (*App. 34.*) Nets.
 Gillespie, J., 1062 (*App. 38.*) Bungs and bung inserters.
 Girdwood, R., 314 (*App. 4.*) Gas burners.
 Glen, G., 176, Railway and tramway rolling stock.
 Goddu, L., 1313 (*App. 41.*) Monitors.
 Goodrich, G. W., 90, Puddling furnaces.
 Goodrich, L. S., 90, Puddling furnaces.
 Gordon, J., 10, Envelopes.
 Goueslain, A., 202, Cocks and vent pegs.
 Gould, S. L., 769 (*App. 36.*) Paper-making.
 Graham, J. C., 13, Cart saddles.
 Gray, R. B., 1233 (*App. 40.*) Granulators.
 Grey, E., 276, Microscopes.
 Grieve, T. W., 294, Theatre stages.
 Griffith, J., 2170 (*App. 52.*) Steam-boilers.
 Grigg, W., 786 (*App. 36.*) Applying electricity to cattle.
 Griswold, L., 2176 (*App. 52.*) Sewing-machines.
 Guernsey, J. W., 1352 (*App. 42.*) Shearing animals.
 Guerriero, A., *Comte de St. Ange*, 2184 (*App. 52.*) Horse-shoes.
 Gumpel, C. G., 9, Lowering ships' boats.
 Gutensohn, A., 258, Obtaining salt of tin and products from waste or refuse tin plate.

H.

Haas, B., jun., 2231 (*App. 52.*) Dial indicators for carriages.
 Hadfield, R., 1787 (*App. 46.*) Wheels, axles, shafts.
 Haggett, W., 1461 (*App. 43.*) Metals.
 Haight, H. J., 966 (*App. 38.*) Artists' scrapers.
 Hale, E., 264, Rolling metals.
 Halfpenny, G. W., 262, Ink, incombustible paper, envelopes and books.
 Hall, J. H., 26, Grinding corn.

Hamilton, E. C., 187, Manure.
 Hampton, T., 842 (*App. 37.*) Armour plates.
 Harding, G. E., 2064 (*App. 50.*) Furnaces.
 Harrison, B., 32, Mechanical motive-power.
 Harrison, C., 121, Umbrellas, parasols and sunshades.
 Harrison, C. W., 1, Air-gas.
 Hartley, R., 81, Singeing yarn.
 Harwood, L. K., 967 (*App. 38.*) Pumps.
 Haseltine, G., 13, cart saddles; 77, Hospital beds; 126, Projectiles; 128, Rolling metals; 213, White lead; 233, Washers; 259, Dressing millstones; 303, Hinges; 351 (*App. 31.*) Torpedo launches; 459 (*App. 33.*) Hoes; 681 (*App. 35.*) Economizing fuel; 806 (*App. 36.*) Lamps; 932 (*App. 37.*) Casting metals; 967 (*App. 38.*) Pumps; 1250 (*App. 40.*) Elevating apparatus; 1352 (*App. 42.*) Shearing animals; 1517 (*App. 44.*) Railway carriage-couplings; 1622 (*App. 45.*) Paper bags; 1641 (*App. 45.*) Separating liquids and substances; 2064 (*App. 50.*) Furnaces; 2212 (*App. 52.*) Sewing-machines; 2255 (*App. 1.*) Valves; 2257 (*App. 1.*) Inhaling apparatus; 2270 (*App. 1.*) Railway watering columns; 2284 (*App. 1.*) Weaving; 2287 (*App. 1.*) Reaping and mowing; 2311 (*App. 1.*) Distilling turpentine; 2353 (*App. 2.*) Tanning; 2354 (*App. 2.*) Rotary engines.
 Hatfull, R., 281, Preventing and removing incrustation in steam-boilers.
 Hawkins, J. G., 220, Gas.
 Haycock, S. H., 126, Projectiles.
 Hayek, —, 310 (*App. 31.*) Artificial stone.
 Hemingway, J., 297, Railway keys and wedges.
 Henderson, A. C., 1644 (*App. 45.*) Hydro-caloric motors; 1645 (*App. 4.*) Fetting furnaces.
 Henley, T. F., 212, Meat extract.
 Henley, W. T., 254, Puddling furnaces.
 Henry, M., 33, Water gauges.
 Henson, H. H., 191, Shaping and punching iron.
 Herrick, S. K., 2185 (*App. 52.*) Sewing-machines.
 Hersey, C. H., 1233 (*App. 40.*) Granulators.
 Hersey, F. C., 1233 (*App. 40.*) Granulators.
 Hewett, S. B., 1793 (*App. 46.*) Fire-places.
 Heyworth, E., 1890 (*App. 48.*) Steam-boilers.
 Highton, H., 85, Electric telegraphs.
 Hillmann, J. H., 90, Puddling furnaces.
 Hindley, G., 178, Dressing stone.
 Hinds, E. C., 282, Preventing accidents on railway platforms.
 Hipkins, E., 165, Iron safes.
 Hitchcock, R., 356 (*App. 31.*) Lamps.
 Hodges, S. H., 1380 (*App. 42.*) Boots and shoes.
 Hodson, H. F., 93, Agricultural and horticultural implements.
 Hollingworth, J., 1464 (*App. 43.*) Weaving.
 Holman, S., 115, Gas retort mouthpieces, lids and fasteners; 136, Raising and lowering gas purifier lids, &c.
 Holmes, J. E., 98, Centrifugal machines and kilns.
 Hookham, G., 240, Metallic box fastenings.
 Hookham, H. J., jun., 240, Metallic box fastenings.
 Hopkinson, J. T., 181, window fasteners.
 Horner, G., 188, Spinning.
 Horsley, T., jun., 204, Closing cartridge cases.
 Howard, E. I., 2255 (*App. 1.*) Valves.
 Howe, W. H. I., 1428 (*App. 4.*) Fruit preserving cans, &c.

Howlett, E. J., 1622 (*App. 45.*) Paper bags.
Huch, E. H., 288, Soup farina.
Hugall, C. E., 177, Window fasteners.
Hughes, E. T., 63, Towing canal boats.
Hughes, P., 96, Dishes and plates.
Hunt, B., 40, Printing telegraphs.
Hunt, S., 142, Building blocks.
Hunter, C. D., 2257 (*App. 1.*) Inhaling apparatus.
Huntington, F. A., 1753 (*App. 46.*) Steam boilers and furnaces.
Hutchings, A. J. H., 588 (*App. 3.*) Pickling.
Hutchinson, J., 1464 (*App. 43.*) Weaving.

I.

Imray, J., 309 (*App. 1.*) Steam-boilers; 325 (*App. 1.*) Heating, evaporating, distilling, &c.
Ireland, W., 263, Wheel tyres.

J.

Jackson, W., 338 (*App. 3.*) Heating feed water.
Jacobsen, F., 266, Manure.
Janney, E. H., 1517 (*App. 44.*) Railway carriage-couplings.
Jarman, H., 164, Steering ships.
Jaynor, A., 66, Steering and hoisting.
Jelley, R. S. C., 271, Cutting tenons.
Jensen, P., 149, Printing telegraphs.
Jewitt, H., 55, Toys.
John, W. H. St., 2527 (*App. 4.*) Purifying gas.
Johnson, J. H., 18, Spinning; 43, Transmitting power; 155, Fire-arms; 247, Signals; 305, Manure; 319 (*App. 4.*) Self-setting animal traps; 356 (*App. 31.*) Lamps; 1234 (*App. 40.*) Steam-engines; 1947 (*App. 48.*) Speed indicators; 2061 (*App. 50.*) Casting metals.
Johnson, J. O., 2342 (*App. 2.*) Fluid meters.
Jones, F. L., 298, Weaving.
Jones, H., 187, Manure.
Jones, J. S., 283, Basting meat.
Jones, R. C., 271, Cutting tenons.
Jones, S. B., 261, Railway carriages and platforms.
Jones, W., 118, Valves.

K.

Kalmar, A., 5, Compasses.
Kesterton, G. T. de., 104, Water meters.
Kesterton, H., 53, Rolling metals; 54, Metal telegraph posts; 253 Steam-boilers.
King, J. A., 116, Peat-fuel.
Kininmonth, J., 102, Bakers' ovens.
Kirkman, J., 200, Governors.
Knight, E., 806 (*App. 36.*) Lamps.
Knight, J., 234, Umbrellas, parasols and sunshades.
Knowles, M., 105, Weaving.
Kolb, A., 316 (*App. 4.*) Ventilating closets, &c.
Konn, S. W., 91, Electrical heat.
Krauss, H., 80, Air-gas.
Kreb, F., 1584 (*App. 44.*) Printing telegraphs.

L.

Laak, L. Van, 1062 (*App. 38.*) Bungs and bung inserters.
Lacón, W. S., 186, Lowering ships' boats.
Lake, W. R., 26, Grinding corn; 27, Cleaning horses; 79, Thread spools; 80, Air-gas; 127, Pipe-joints, elbows or couplings; 225, Fireproof vaults; 226, Fireproof safes; 227, Boots and shoes; 279, Railway breaks; 290, Refrigerating; 300, Clothes wringers; 317 (*App. 4.*) Breakwaters; 396 (*App. 4.*) Treating middlings; 558 (*App. 33.*) Drilling and boring; 1737 (*App. 46.*) Veneers; 1770 (*App. 1.*) Traction-engines.
Lamb, J. W., 73, Knitting machines.
Lanier, G. P., 130, Mattresses.
Larmann, F. W., 2481 (*App. 4.*) Tuyeres.
Lartigue, H., 247, Signals.
Larue, J., 172, Printing.
Latham, B., 331 (*App. 47.*) Manure.
Laurette, L., 386 (*App. 4.*) Artificial stone.
Law, J., 71, Carding-engines.
Law, S., 71, Carding-engines.
Laycock, T., 1078 (*App. 39.*) Sewing-machines.
Leatham, W., 30, Valves.
Lee, H., 2287 (*App. 1.*) Reaping and mowing.
Lee, J. H., 594 (*App. 34.*) Steam-boilers and engines.
Lee, R. B., 190, Metal telegraph posts.
Leeming, T., 46, Bronzing and coloring paper, &c.
Leigh, J. S., 15, Aërial tramways.
Leon, W. F., 2057 (*App. 50.*) Hydraulic hoists.
Lloyd, R., 2311 (*App. 1.*) Distilling turpentine.
Lobdell, G. G., 2061 (*App. 50.*) Casting metals.
Lodighin, A. N., 91, Electrical heat.
Longworth, T., 298, Weaving.
Loo-Wauters, F. Van, 63, Towing canal boats.
Loryea, A. M., 217, Hydraulic motive-power.
Lowe, O., 36, Steam-boilers.
Lowe, S., 73, Knitting machines.
Lynde, F. G., 46, Bronzing and coloring paper, &c.
Lyttle, W. A., 52, Roofs, floors and pavements; 158, Railway chairs.

M.

McCarty, B. F., 681 (*App. 35.*) Economizing fuel.
McClean, F., 41, Raising ships.
McClure, W. B., 13, Cart-saddles.
McWilliams, A. S., 2005 (*App. 49.*) Sheep shears.
Macauley, H., 92, Fire-arms.
Macneill, Sir J., 206, Tramways and carriages.
Macneill, R., 184, Pavements.
Maitre, E., 2010 (*App. 49.*) Covering surfaces with wood.
Manbré, A., 2, Valves.
Marquez, P., 317 (*App. 4.*) Breakwaters.
Martin, B. G., 486 (*App. 33.*) Presses; 1148 (*App. 39.*) Presses.
Martin, C., 174, Spinning.
Martin, S. B., 290, Refrigerating.
Marval, H. C., 398 (*App. 3.*) Fire-arms; 413 (*App. 3.*) Fire-arms.

Mason, F. H., 681 (*App. 35.*) Economizing fuel.
Masourine, M. S., 207, Caissons.
Matthews, C., 264, Rolling metals.
Matthews, W. J., 138, Fire-arms.
Mayers, H., 2057 (*App. 50.*) Hydraulic hoists.
Meakin, G. F. L., 1179 (*App. 49.*) Hanging sashes and shutters.
Mellor, W. W., 132, Cutting glass.
Meylert, A. P., 213, White lead.
Michaud, P. F., 629 (*App. 34.*) Axle-boxes.
Mickle, W., 803 (*App. 36.*) Smelting and puddling iron; 921 (*App. 37.*) Economizing fuel; 1656 (*App. 45.*) Economizing fuel.
Middlehurst, James, 346 (*App. 4.*) Potato and other root gatherers, &c.
Middlehurst, John, 346 (*App. 4.*) Potato and other root gatherers, &c.
Middlemass, J., 306, Clerical costumes.
Milburn, J., 483 (*App. 4.*) Chimney cowls.
Miller, S. H., 19, Dies.
Mills, J. H., 1924 (*App. 48.*) Steam-boilers and engines.
Mills, J., L., 123, Printing.
Milner, E., 196, Lubricating.
Monkhouse, T. S., 123, Printing.
Moody, C., 2023 (*App. 49.*) Locks.
Morgan-Brown, W., 822 (*App. 36.*) Boots and shoes; 1233 (*App. 40.*) Granulators; 1901 (*App. 48.*) Hydraulic hose.
Morris, E. R., 29, Chartometers.
Muirhead, L. P., 244, Speed indicators.
Myers, A. G., 127, Pipe-joints, elbows or couplings.

N.

Napier, J., 246, Excavating under water.
Naylor, M., 167, Weaving.
Needham, J., 31, Fire-arms and cartridges.
Neil, W., 2067 (*App. 50.*) Distilling spirituous liquors.
Newcomb, W., 967 (*App. 38.*) Pumps.
Newell, L. D., 503 (*App. 3.*) Ships' berths and sofas.
Newton, A. V., 20, Paper-ruling machines; 257 Steam vacuum pumps.
Newton, W. E., 19, Dies; 28, Musical instruments; 89, Waterwheels; 90, Puddling furnaces; 256, Fire-arms.
Nichols, F. W., 303, Hinges.
Nichols, J., 215, Ventilating waterclosets, &c.
Norman, J., 135, Clipping animals.

O.

O'Donoghue, J. D., 2420 (*App. 3.*) Tooth brushes.
O'Donoghue, W., 2420 (*App. 3.*) Tooth brushes.
Oldknow, J., 24, Lace-making.
Olds, P. F., 681 (*App. 35.*) Economizing fuel.
Olley, G., 338 (*App. 3.*) Heating feed water.
Olsen, C. H. G., 149, Printing telegraphs.
Onderdonk, J. P., 1622 (*App. 45.*) Paper bags.
Osborn, S., 313 (*App. 4.*) Forging metals.
Osborne, D. T., 198, Self feeding air-tight stoves.
Osborne, J. W., 1947 (*App. 48.*) Speed indicators.
Owen, J., 160, Mine shafts and hoists.

P.

Paddison, H., 193, Breakwaters, docks, piers, &c.
Page, R. W., 107, Cutting screws.
Paget, F. A., 5, Compasses.
Palmer, R., 198, Self feeding air-tight stoves.
Parker-Rhodes, C. E., 173, Illuminating clocks, names, signs, &c.
Parkyn, J., 396 (*App. 4.*) Treating middlings.
Parlour, J. T., 25, Cabs and other vehicles; 144, Wheels for carriages.
Pasquier, A., 295, Clocks.
Patterson, R. H., 274, Purifying coal gas.
Pearl, O., 18, Spinning.
Pearson, W., 121, Umbrellas, parasols and sun-shades.
Peebles, D. B., 7, Gas regulators.
Pelouze, E. P., 109, Condensing liquefiable matters.
Pengilly, C., 563 (*App. 34.*) Filters.
Perkins, C. H., 128, Rolling metals.
Perman, C. H., 194, Metallic boxes.
Petersen, C., 1394 (*App. 42.*) Ships' logs.
Philippi, F., 11, Smelling bottles.
Picq, H., 43, Transmitting power.
Pink, R., 263, Wheel tyres.
Pitcher, W., 146, Craping hair, &c.
Pitt, R., 273, Leather.
Pitt, T., 284, Fire-arms.
Platt, J., 156, Fire-places.
Plessner, J. M., 180, Lamps.
Poage, J. N., 2270 (*App. 1.*) Railway watering columns.
Pohl, O. E., 4, Salt.
Pope, F. L., 1641 (*App. 45.*) Separating liquids and substances.
Porter, B., 201, Weaving.
Porter, H., 224, Barometers.
Power, H. L., 152, Umbrellas.
Pratt, W. T. C., 150, Steering ships.
Preece, W. H., 153, Railway signals.
Preston, W. R., 187, Manure.
Pringle, C., 594 (*App. 34.*) Steam-boilers and engines.
Pritchard, G., 106, Metal tubes and bars.
Procopé, M., 564 (*App. 34.*) Nets.
Puckle, H. J., 245, Aërial tramways.
Purdie, J., 233, Washers.

Q.

Quelch, W. B., 141, Heating and ventilating buildings.
Quimbel, G., 309 (*App. 1.*) Steam-boilers.
Quintavalle, R., 150, Steering ships.

R.

Rainbow, W., 297, Railway keys and wedges.
Ray, R., 46, Bronzing and coloring paper, &c.
Rawle, G., 14, Tanning.
Redgrave, J., 223, Glass vessels.
Reed, J. H., 1052 (*App. 38.*) Pegging boots and shoes.

Rhodes, C. E. P., 173, Illuminating clocks, names, signs, &c.
 Riley, E., 254, Puddling furnaces.
 Rippin, E. C., 2108 (*App.* 51.) Signals.
 Ritchell, C. F., 558 (*App.* 33.) Drilling and boring.
 Roberts, L., 94, Railway rails.
 Robertson, J., 248, Forcing, exhausting and measuring air, gas, &c.
 Robey, J., 230, Purifying, disinfecting and deodorising.
 Robinson, W., 67, Signals.
 Rogé, H. N., 237, Railway switches and points.
 Rogers, H., 129, Carriages.
 Rogers, S. A., 190, Metal telegraph posts.
 Rosa, W. V. V., 356 (*App.* 31.) Lamps.
 Rose, H. C., 255, Horse shoes.
 Rose, W. W., 55, Toys.
 Rosenfield, A., 2057 (*App.* 50.) Hydraulic hoists.
 Ross, J., 2238 (*App.* 52.) Sewing boots and shoes.
 Ross, L. E., 2284 (*App.* 1.) Weaving.
 Roturier, J., 101, Turning the leaves of music books.
 Rowland, T. F., 1287 (*App.* 41.) Gas retorts.
 Rydill, G., 82, Drying-machines; 229, Dyeing, staining and drying animal and vegetable substances, &c.
 Rylands, J., 817 (*App.* 4.) Straightening, measuring and cutting wire and metal rods.
 Ryle, J., jun., 2332 (*App.* 2.) Refrigerators.

S.

Salleron, J., 509 (*App.* 33.) Corks.
 Salmon, P., 147, Gas, oil-gas engines and boilers.
 Samain, P., 1944 (*App.* 48.) Fire-arms.
 Sault, J., 2504 (*App.* 4.) Spreading silk.
 Sawyer, A. F., 217, Hydraulic motive-power.
 Sawyer, W. H., 1641 (*App.* 45.) Separating liquids and substances.
 Scheidecker, C., 661 (*App.* 34.) Shearing animals.
 Schenck, —, Bart., 310 (*App.* 31.) Artificial stone.
 Schmidt, H., 88, Marking timber, &c.
 Schoevers, A. T. C., 84, Trusses for hernia.
 Scholefield, R., 170, Brick making.
 Schwarz, L., 2218 (*App.* 52.) Economizing fuel.
 Schwarzenbach, V., 208, Gilding on glass.
 Scollay, G. W., 1815 (*App.* 47.) Preserving food.
 Scott, H. Y. D., 154, Treating sewage; 183, Purifying coal gas; 296, Manure.
 Scott, W., 138, Fire-arms.
 Seeling, H., 79, Thread spools.
 Seiferheld, A., 103, Boots and shoes.
 Seitz, C. D. J., 197, Paper making.
 Shanks, J., 199, Water supplying.
 Sharer, T., 238, Railway rolling stock.
 Shaw, J., 597 (*App.* 2.), Punching and shearing.
 Shaw, W., 1298 (*App.* 41.) Printing.
 Shedd, W., 1101 (*App.* 39.) Fibres.
 Sholl, C., 525 (*App.* 1.) Atmospheric hammers.
 Shuttleworth, J., 1078 (*App.* 39.) Sewing-machines.
 Sigourney, J. M., 356 (*App.* 31.) Lamps.
 Small, J. H., 27, Cleaning horses.
 Smith, A. H., 23, Crushing stone, &c.
 Smith, D., 1079 (*App.* 39.) Railways.
 Smith, G., 70, Ventilating boots and shoes.

Smith, H. J., 351 (*App.* 31.) Torpedo launches.
 Smith, J. Y., 279, Railway breaks.
 Smith, S., 352 (*App.* 4.) Indicating and checking number of passengers, amounts of fares, attendances of workmen, &c.
 Smith, T. J., 124, Steam-boilers.
 Smith, W. B., 133, Sewing machines.
 Sokolnicki, J., 336 (*App.* 4.) Lamps.
 Soul, M. A., 101, Turning the leaves of music books.
 Sowerbutts, A., 100, Raising ships.
 Spence, P., 50, Treating waste liquors in alum works.
 Sprague, W., 1770 (*App.* 1.) Traction-engines.
 St. Ange, Comte de, 2184 (*App.* 52.) Horse shoes.
 St. John, W. H., 2527 (*App.* 4.) Purifying gas.
 Stacy, G., 2012 (*App.* 49.) Stone cutters.
 Starley, J., 133, Sewing machines.
 Stead, J., 249, Rotatory engines.
 Stead, T., 291, Washing and wringing machines.
 Stebins, T., 2057 (*App.* 50.) Hydraulic hoists.
 Steinhoff, G., 88, Marking timber, &c.
 Stell, S., 111, Consuming smoke and saving fuel.
 Stephens, L. A., 97, Bottles and corks.
 Stephens, W. B., 35, Paints.
 Sterling, W. H., 2022 (*App.* 49.) Preserving iron.
 Stevens, L., 216, Carbonic oxide.
 Stidder, J. G., 236, Water waste preventers.
 Stone, T., 231, Carding engines.
 Stroudley, W., 6, Casting metals.
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AND TO

APPENDIXES FROM JAN. 26, TO JULY 25, 1873.

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 4. Index of Subject-matter to Chronological and Descriptive Index from January 1 to January 25, 1873, and to Appendixes from January 26 to July 25, 1873.
 5. Reprint of leaf (pages 529 and 530) with Abridgment No. 2381 of the year 1872 inserted. To be substituted for the corresponding leaf in No. 33, Chronological and Descriptive Index for 1872, which was published before the Abridgment No. 2381 could be printed.
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CHRONOLOGICAL AND DESCRIPTIVE INDEX
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CONTAINING THE
SUMMINGS OF PROVISIONAL AND COMPLETE SPECIFICATIONS

Delivered from January 26 to February 1, 1873.

A.D. 1873, January 27.—No. 309.

JOHN, of No. 20, Southampton Buildings, Chancery Lane, in the county of Middlesex.—(*A communication from Gustave Quimbel, of Elbeuf, France, boiler-maker.*)—"Improvements in steam boilers." The invention relates to a construction and arrangement of steam boilers and their flues and heating apparatus as to utilize to the greatest extent the heat of the fire. The body of the boiler is made of crescent shape, the hollow of the crescent forming a fire place and flue. Pipes and in flues in the setting on each side of the boiler are placed cylindrical generators communicating with the boiler. Below the boiler the flue is carried downwards and to and fro in a zig-zag section, and in each of these zig-zag channels is placed a tube communicating at opposite ends with the flues above and below it. The feed water is supplied to the lowest and coolest of these tubes, and as it passes upwards to a tube placed in the ashpit, which communicates with the boiler by its side. The products of combustion after leaving the last of the zig-zag flue channels are carried through zig-zag pipes of thin metal placed in a chamber through which air passes to the boiler fire, the air is heated and the products of combustion cooled before they escape to the chimney. When required, the boiler a valve or damper is opened, permitting the products of combustion to pass directly from the side flues of the boiler to the chimney until the draught be established.

A.D. 1873, January 27.—No. 310.

ILLÉ, HENRI ADRIEN, of the British and Foreign Patent Offices, 18, Rue de la Chaussée d'Or, Paris, France, and 6, Piccadilly, in the county of Middlesex, patent agent.—(*A communication from Schenck, Baronet, and Hayek, acting as administrators of the company known as Weiss Cement Gesellschaft, two persons resident at Vienna, Austria.*)—"A new and improved artificial stone or cement applicable in aquatic or other buildings, also moulded and made applicable to ornamental, architectural, or other purposes." The invention relates to the manufacturing of a water mortar, and consists in using the dolomites or magnesite stones or the minerals which contain at least 25 % of $Mg\ C^2O_3$ or the productions of chemical processes, which are combinations of magnesia, and which can be reduced by heat.

A.D. 1873, January 27.—No. 311.

ANNIE AUGUSTA, of Sydenham Park, in the county of Kent, widow.—"An improved utensil for shaping and ornamenting butter and pastry." The features of novelty of this invention consist in forcing butter or pastry through a cylinder provided with a perforated star or other shaped end, or with a small taper tube at one end, or with a tube with a central thereof, to form a small tube of dough.

A.D. 1873, January 27.—No. 312.

FRANCIS, of Salford, in the county of Lancaster, and DENBY, WILLIAM SAMUEL, of Heaton, in the said county, ironfounders.—"Improvements in steam boilers and apparatus connected therewith, parts of which are applicable as a motive power, also in boilers for heating purposes, and in economizers for heating the feed water of steam boilers." The invention consists of a series of peculiarly formed pipes, preferably of an inverted U form, which when connected together are applicable as steam boilers, as boilers for heating water for warming buildings, and as economizers. Price 4d.

fuel economizers for heating the feed water of steam boilers. This also consists of means described, and of apparatus used for utilizing the waste heat and gases of steam boilers. Lastly, the invention refers to a method of obtaining motive power for carrying out the aforesaid object, the power being also applicable to other purposes.

A.D. 1873, January 27.—No. 313.

THEAKER, HENRY, and OSBORN, SAMUEL, both of Sheffield, in the county of York.—“Improvements in apparatus for forging or shaping metals.”

In carrying out the invention any convenient form of direct-acting or tilt-hammer may be used, but instead of the ordinary anvil there is substituted a movable roller or anvil capable of turning round on an axis transverse to the line of motion of the hammer. Or the anvil may be in an approximately segmental form and turn through part of a circle. The bottom of the anvil is supported by a concave seat on an anvil bed. The anvil is grooved or indented to correspond with the shape to which the article is to be forged, or separate indented pieces may be fixed on the anvil for that purpose. Provision is made for turning the anvil gradually between the strokes of the hammer by a ratchet wheel actuated by a pawl and lever from the head of the hammer.

A.D. 1873, January 27.—No. 314.

GIRDWOOD, ROBERT, of Edinburgh, in the county of Mid Lothian, North Britain.—“An improved portable apparatus for illuminating by means of gas.”

One improved appliance consists of a short metal tube fitted with a burner and with a clip by means of which it can be easily fixed on any article whilst the gas is supplied to it by flexible tubing. A clip or portable bracket may be used with two burners or the burner tube or bracket may be attached to the frame or stand of a looking-glass leaving only the flexible tube as the detachable part.

A.D. 1873, January 27.—No. 315.

HART, GEORGE WILLIAM, of 11, Palace Road, Upper Norwood, in the county of Surrey.—“Improvements in apparatus for generating steam.”

This Provisional Specification describes forcing the products of combustion into the boiler through tubes which are open at their ends and which dip into the water.

A.D. 1873, January 27.—No. 316.

KOLB, ADOLPH, of No. 1, Circus Place, Finsbury, in the county of Middlesex, and ALLSOP, COLERIDGE, of Old Broad Street, in the city of London.—“Improved means of rendering closets and other places inodorous, and in the arrangements of appliances for the purpose.”

This relates mainly to double pipes merging into one for removing smell and foul gases from an enclosed receiver into which the excreta is free to fall.

A.D. 1873, January 27.—No. 317.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Pedro Marquez, of Paris, France.*)—“Improvements in breakwaters.”

I may construct the breakwater of various materials. It may have air chambers and ballast or may be built of wood with iron ties. If calculated for waves rising twelve feet from their natural level it should have an elevation of thirty feet and a proportionate width to give it the required stability. It has a number of stays, which are the most numerous at the extremities where the greatest strain is borne. Curved supports are extended from end to end of the structure to prevent the deflection of the heads. Floats are employed at the front of the structure and properly secured by chains in combination with two series of anchors.

A.D. 1873, January 27.—No. 318.

BENTALL, EDWARD HAMMOND, of Heybridge, near Maldon, in the county of Essex, agricultural implement maker.—“An improved construction of chaff cutter.”

Instead of driving the feed rolls directly from the worm on the fly wheel shaft, I cause the worm to gear into and drive an intermediate worm wheel keyed on the end of an additional transverse shaft in rear of the feed rolls; this shaft I fit at its opposite end with a change wheel, which gears into a change wheel on the axle of the lower roll.

A.D. 1873, January 27.—No. 319.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Robert Edwin Dietz, of the city, county and state of New York, United States of America.*)—"An improved self setting animal trap."

The object of this invention is to catch a number of animals successively in a single trap, and this object is accomplished by constructing the trap so that each animal, when caught, shall, in passing from a dark into a light compartment, in its efforts to escape re-set the trap.

A.D. 1873, January 27.—No. 320.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from George Broomhead, of Paterson, in the county of Passaic and state of New Jersey, United States of America.*)—"A new or improved machine for scouring and polishing wire."

This invention consists of a machine by which the wire is scoured and polished by motive power at a greatly reduced expense than hitherto.

A shaft mounted at one [end*] of a frame carries a spool-drum, on which the wire to be polished is placed, the wire being thence led through the polishing material, which is contained in boxes or projections on a bar to which reciprocating motion is given, the wire being subsequently wound on a drum at the opposite end of the machine.

A.D. 1873, January 27.—No. 321.

HUGHES, EDWARD THOMAS, of the firm of Hughes and Son, patent agents, 123, Chancery Lane, London.—(*A communication from Albert Snoeck and Emile de Labarre, of Ensival, Belgium, manufacturers.*)—"Improved combinations of textile or fibrous threads, and for the machinery or apparatus connected therewith."

In each case the combination consists of a thread of wool or other fibrous material having twisted upon it at any desired distances apart pieces of other threads of one or more different colours and lengths.

The main threads of any colour are beamed on a beam, from which they pass to a grooved cylinder or revolving comb, and from thence between an endless apron and friction roller to a taking up beam.

The threads, of which portions have to be held to and afterwards twisted upon the main threads, are wound on a beam or roller and pass by surface motion, imparted by a driving roller through a comb or reed, to a small roller having the same surface speed as the driving roller and weighted by a roller upon it.

A.D. 1873, January 27.—No. 322.

LEWIS, HENRY, of Newington Causeway, in the county of Surrey, shoemaker.—"Improvements in machinery or apparatus for making boots and shoes."

The novelty of this invention consists in "lasting," "soling," and "heeling" in one process.

The "bottom stuff" or sole leather and heel pieces are placed in a mould, the uppers being "lasted" over the last by a number of pincers, which are raised and depressed by means of levers actuated by a cam on a main driving wheel.

The upper is kept in its place and secured to the inner sole by means of a number of pin points forced from the interior of the last.

The mould containing the "bottom-stuff" is forced up to the last, and the pin points are then further forced into the leather, securing the "bottom stuff" to the "upper."

The boot in this condition being ready for sewing by a boot sewing machine.

If, however, a rivetted boot is required, the rivets are put in from the bottom mould, the one action of the machine effectively "lasting," "soling," and "rivetting" the whole boot.

A.D. 1873, January 27.—No. 323.

HALEY, SAM, and HALEY, SUGDEN HERBERT, of the firm of Thomas Haley and Company, of Bramley, in the county of York, engineers and machinists.—"Improvements in machinery or apparatus for 'boarding,' 'softening,' and 'breaking up the grain' of hides and skins."

This invention consists in mounting in suitable framework two rollers capable of rotating, said rollers carrying an endless belt, and also another pair of rollers with endless belt mounted above the former, the

* The word "end" is found in the copy of the Abridgment delivered by the Applicant, but does not appear in the original Abridgment.

bearings of one or both being moveable, so that by means of lever and weight the same may be lifted clear of contact.

The surfaces of the belts are prepared with cork or other frictional or an adhesive matter. The hide is passed through between the belts, which are made to travel and reciprocate.

A.D. 1873, January 28.—No. 324.

SMITH, HENRY, of 5, Hillmartin Villas, Nightingale Road, Wood Green, in the county of Middlesex, chemist.—“Improvements in the apparatus connected with feeding bottles for infants and for other purposes.”

This invention consists in applying to the bottom of the suction pipe of an infant's feeding bottle an india rubber valve of peculiar form, and also in attaching to the stoppers of such bottles a similar valve, so that the tube is always kept full and no leakage takes place from the bottle.

A.D. 1873, January 28.—No. 325.

IMRAY, JOHN, of No. 20, Southampton Buildings, Chancery Lane, in the county of Middlesex.—“Improvements in the means of subjecting substances to heat for effecting continuously drying, roasting, calcining, evaporating, distilling, gas-producing, and other like operations, and apparatus therefor.”

This invention relates to means of applying heat to substances so as to effect continuously operations such as drying, roasting, calcining, evaporating, distilling, gas producing, and the like.

A heated liquid such as molten metal is caused to circulate either regularly or intermittently by pulses in a canal, or in channels communicating with each other, so that the liquid makes a complete circuit.

The matter to be operated on is dropped or fed upon the circulating liquid and carried along by it, subjected to the heat during its progress, the matter or residuary matter being removed at another part of the circuit.

For drying and like operations when the gases or vapours evolved are not to be collected, the canal may be open. But for distilling, gas producing, and the like, the canal is closed over like a pipe, or covered by a hood of inverted U shape, the limbs of the hood dipping into the circulating liquid so as to seal the interior from the outer air.

A.D. 1873, January 28.—No. 326.

HASELTINE, GEORGE, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Thomas Hankey Alexander, of Washington, district of Columbia, United States of America.*)—“An improved process of converting cast iron into steel, applicable to the manufacture of edge tools.”

The nature of the said invention consists in making steel from cast iron by first making the cast iron partially malleable and then manipulating and tempering the same. In making edge tools the tool is first made of iron cast in any of the usual ways, and then placed in an annealing furnace. The tool is then removed from the annealing furnace, cleaned and hammered into shape, and cut by shears. The said tool is then placed in a heating furnace, and then immersed in water or other tempering liquid.

A.D. 1873, January 28.—No. 327.

WHARLDALE, WILLIAM, of Pontefract, in the county of York, wood turner.—“Improvements in stoppers for bottles.”

The improved stoppers I make of cork and wood, or of cork combined with any other suitable material, the combination of which will cause the stopper to be of less specific gravity than water or the liquid in the bottle.

The cork portion of the stopper is made tubular, of a length and size to fit the neck of the bottle. Inside it I fit a screw (or plain) plug of wood or other suitable material, on to the top or screwed end of which I fit a screwed washer, which, in addition to securing the stopper in its place, prevents any dirt or extraneous matter getting inside the bottle neck.

In stoppering bottles with these improved stoppers, the stopper is first pushed into the interior of the bottle, then the aerated liquid (for example) is poured or forced in; the bottle being kept in an upright position, the stopper will then float up and be forced into its proper place in the neck of the bottle, being kept there by the wedging or compression of the cork portion of the stopper, and the plug (in the case of the screw plugs) can then be secured at the mouth of the bottle.

A.D. 1873, January 28.—No. 328.

SMITH, THOMAS JAMES, of the firm of Robertson, Brooman, and Company, of 166, Fleet Street, in the city of London, patent agents.—(*A communication from Cyprien Marie Tessié du Motay, of Paris, France, chemist.*)—"Improved processes and furnace with appliances for the economical production of baryta."

This refers to an arrangement of furnace with the employment of solid or gaseous combustibles for the transformation by the dry method of sulphate of baryta into sulphuret of barium and of carbonate of baryta into baryta.

A.D. 1873, January 28.—No. 329.

RYDILL, GEORGE, of Grove House, Dewsbury, in the county of York.—"Improvements in steam boilers, " steam generators, furnaces, and apparatus for generating steam, heating fluids, gases, and for other " purposes for obtaining motive power and applying heat."

This invention of improvements has for its object to obtain a more economical motive power by means of steam, heated air, or a mixture of steam and heated air; also raising the temperature of liquids, vapours, or gases in steam boilers, preventing smoke, and economising fuel by the arrangement and apparatus connected with the same.

A.D. 1873, January 28.—No. 330.

GIBBS, HENRY HYNE, of Stroud, in the county of Gloucester, manufacturer.—"Improvements in the " manufacture of driving straps or bands."

According to this invention, driving straps or bands are made by taking pieces of leather having a rhombic figure, and placing them side by side so that their longer sides are in contact and their short ends in the same right lines. The longer sides of the rhombic pieces being sewn together, a band or strap is formed, the junctions of the pieces of leather crossing the band obliquely. The outer edges of the band may be protected by straight or longitudinal strips of leather. Double or compound bands may be made by using two or more of the bands or layers described, the said layers being so arranged that the junctions of the pieces of one layer cross the junctions of the pieces of the other layers, and the two or more layers are cemented and pegged together, and for additional strength are stitched together.

The cement between the layers may be dispensed with, and the pieces of leather may be rectangular and their junctions cross the band at right angles.

A.D. 1873, January 28.—No. 331.

LATHAM, BALDWIN, of No. 7, Westminster Chambers, Victoria Street, Westminster, in the county of Middlesex.—"Improvements in purifying sewage and treating products obtained therefrom for the " production of manure."

This invention consists in utilizing the precipitate obtained from sewage in the "alumina," "phosphate of alumina," and other phosphatic processes, and the "magnesia" and "iron" processes for treating other sewage for the production of manure.

The said precipitate is first dried, and after standing some time is treated with sulphuric or other acid, so as to convert the alumina in sulphate and sesqui-sulphate of alumina and the phosphates of alumina, and lime into superphosphates, and also to carbonize some of the organic matter. The compound so treated is then mixed with the sewage, together with sufficient alkali to neutralize the acid, whereupon the resulting alumina, phosphate of alumina, and phosphate of lime, are precipitated, and at the same time, the flocculent deposit formed drags down the suspended matters in the sewage, while the humus, mould, and carbonized matter of the compound combine with some of the ammonia.

The deposit thus obtained may be used as a manure, or it may be dried and treated and be again applied to other sewage, in the above described manner, in order to obtain a rich manure.

The solid matter may be first removed from the sewage by the apparatus described in the petitioner's Specification, No. 809, of 1869.

A.D. 1873, January 28.—No. 332.

BERNSTEIN, ALEX, of Berlin, in the Kingdom of Prussia, engineer.—"Self acting apparatus for effecting " electric contact by passing trains or carriages on rail or tramways."

The invention relates to the use of bars at the sides of the ordinary rails, in position to be acted upon by the wheels, such bars acting by a cross bar on a double spring carrying a plate capable on the depression of both bars of acting on an india rubber bag to cause air to flow, and by bringing parts into connection effect by electrical communication an alarm or signal.

A.D. 1873, January 28.—No. 333.

BERNSTEIN, ALEX, of Berlin, in the Kingdom of Prussia, engineer.—“Improvements in apparatus for controlling switches.”

The object of the invention is to obtain at the station master's or other room electrical control over the positions of the various switches leading to the station, and an indication of their relative positions.

The switches are capable of being actuated by rods and lever arms by the person in charge, and they have rods with enlargements or cornuses thereon for effecting variable electrical communication at the station. Electrical contact for the circuits is formed by plugs in recesses for them in plates, so as to connect the respective currents to the respective switches, or shut them off as may be desired, by which divers circuits are capable of being placed in communication, and opened or closed by approaching trains by the self acting electro pneumatic contact, which may also operate electric alarm apparatus.

The station master or other person having received intimation, by the electrical contact acting on the alarm, of the approach of a train places the stopper above referred to into the hole corresponding with the switch into which the train is to run. If he receives the alarm the switch is not set properly; but he has time before the arrival of the train to control the switches and have them duly set, or if the switches are already duly set he receives no alarm.

A.D. 1873, January 28.—No. 334.

SILBER, ALBERT MARCIUS, of Wood Street, Cheapside, in the city of London, merchant.—“Improvements in apparatus for lighting and heating purposes.”

This invention refers to burners, wick-holders, or wick cases, in which oil or combustible liquid is lifted to the wick by moderator or carcel lamp arrangements. One or more orifices are made below the rim (mostly $\frac{3}{4}$ -th of an inch) of the burner or wick holder, so that the oil overflows before reaching the top. The burner may have a bell-mouthed perforated lip joining an outer tube. In one arrangement the oil is raised through a pipe into a closed annular chamber surrounding the wick holder near the top, and feeds the wick through one or more openings. An overflow pipe leads from the upper part of this chamber. Above the oil chamber is an annular air chamber in which is fitted a disc or collar of a material non conductor or weak conductor of heat. It embraces the wick holder and enters both above and below it.

Bell mouthed air tubes may be fitted within the wick-holder or burner.

A.D. 1873, January 28.—No. 335.

TOULSON, JAMES AUGUSTINE HARTLEY, manufacturing chemist, and HARMER, THOMAS, both of Leeds, in the county of York.—“Improvements in the means employed for freeing glass from carbon, grease, or other substances that may adhere to its surface.”

Fluoric acid in combination with muriatic or nitric acid, and sometimes other acids; or fluoric acid with water; sometimes a powder is used composed of pumy stone, slacked lime, salts of tartar, Derbyshire spar, powdered soap, sugar. The invention is particularly applicable to railway station or other large roofs.

A.D. 1873, January 28.—No. 336.

SOKOLNICKI, JOSEPH, of Clinchor, near Castillon (France).—“Improvements in lamps and apparatus for burning mineral oils or other inflammable liquids.”

This invention consists in combining with the burner of the various forms and arrangements of lamps an evaporating tube, for the purpose of keeping up the supply of vapour from the mineral oils or essences or other inflammable liquids, and thereby prevent the light from becoming small or extinct.

A.D. 1873, January 28.—No. 337.

WALTON, WILLIAM, of the Haughton Dale Mills, Denton, in the county of Lancaster, wire card manufacturer.—“Improvements in rolling and combined rolling and drawing wire.”

My invention consists in rolling wire by the combined action of three rollers or two rollers and a block. In performing my invention I make curved or angular chamfers in the edges of two rollers, and I apply a third roller or a block to close the space left by the chamfers in the two other rollers. The round or other shaped wire to be rolled is fed into the space left by the three rollers or two rollers and block.

A.D. 1873, January 28.—No. 338.

OLLEY, GEORGE, of Diss, in the county of Norfolk, engineer, and JACKSON, WILLIAM, of the same place, engineer.—“An improved apparatus for heating water by means of exhaust steam.”

An apparatus for heating water by means of exhaust steam from an engine and utilizing the same, causing a great saving in fuel of high pressure, either for stationary or portable engines. The apparatus is a flange pipe, round or oblong, for receiving the exhaust steam from an engine having an inlet and outlet, also internal pipes, covers, and dome for reversing the water of the internal pipes which receives the water from the pump through the apparatus and returns to the boiler.

A.D. 1873, January 28.—No. 339.

WITTIG, ROBERT, of Chemnitz, in the Kingdom of Saxony, Germany, engineer.—“Improvements in dividing apparatuses on carding machines.”

This relates to a method of arranging the dividing apparatus upon wool combing machines, and to appliances for retaining the necessary tension upon the fleece during the division.

A.D. 1873, January 28.—No. 340.

NEWTON, WILLIAM EDWARD, of the Office for Patents, 66, Chancery Lane, in the county of Middlesex, civil engineer.—(*A communication from Henry Tatem Potter and Joseph Griswold Lamb, both of Norwich, in the state of Connecticut, United States of America.*)—“Improvements in spinning machinery.”

This invention relates to the ring and traveller used in spinning machinery, in which a transverse bar is so combined with the ring and spindle of the ring frame as to rotate freely within the ring and in contact with the spindle or the yarn thereon, for the purpose of causing the yarn to pass to the spindle at an uniform angle, to avoid breakage of the yarn in starting the spindle, and material variations in the size of it.

A.D. 1873, January 28.—No. 341.

JOSLIN, WILLIAM, of Lower Norwood, in the county of Surrey.—“Improvements in furnaces, and in the method of charging them with fuel to improve its combustion and prevent smoke.”

This invention has for its object the more perfect combustion of coal in ordinary boiler and other furnaces for the prevention of smoke by an improved method of arranging the fire bars, and in charging and consuming the coal therein.

In place of setting the grate bars with wide spaces between them, as heretofore practised, according to these improvements they are arranged with spaces between them not exceeding three quarters to half an inch, or even less (by preference using lump coal only, except when the fuel is highly ignited). Or the fire bars may be made with vertical parallel or conical narrow grooves, passages, or channels up their sides and placed close together, the channelled sides forming holes or passages for the admission of air to the furnace.

A.D. 1873, January 28.—No. 342.

BLAKE, PERCY ALBERT, of Highbury, in the county of Middlesex, gentleman.—“An improved self-acting fire-alarm.”

This invention relates to a self acting fire alarm, by means of which the inmates of any house or building or persons in the neighbourhood may be warned of an outbreak before it has attained any considerable magnitude. It consists in disposing a strand or cord of gun-cotton or other quick burning substance about the rooms of a house so that on a fire breaking out the gun-cotton will be quickly ignited and explode one or more cartridges of gun-cotton or other explosive with a sufficiently loud report to give the alarm.

A.D. 1873, January 28.—No. 343.

HOSKING, JOHN, of 19, High West Street, Gateshead on Tyne, in the county of Durham, engineer.—“Improvements in safety valves.”

Safety valves are constructed on the “double beat” principle, with an area exposed to lifting pressure limited to that of an annular portion of the valve at the top; the exits for the requisite escape of fluid being formed between annular moveable and fixed surfaces at the upper and lower parts of the valve.

A.D. 1873, January 28.—No. 344.

CARR, DAVID ALEXANDER, and BARLOW, CRAWFORD PETER, both of 2, Old Palace Yard, Westminster.—“Improvements in railway electrical signal apparatus.”

The object effected by our invention is that no train passing along a line of railway can approach within a limited distance of the preceding train without receiving a warning signal.

Along the line are places (either stations, junctions, or other places on the line) at which a signal can be transmitted electrically on to the engine or on to any carriage of a train by preference through insulated metal bars placed along the line in the manner described in the Specification of a former Patent granted to us on the 18th day of May 1872 (No. 1520). In between these are other places, at which a train passing over a lever or other mechanical or electrical apparatus causes the insulated bar at the station the train has just left to be uncoupled from a battery, so that any following train arriving at such station would receive a signal of line blocked, and at the same time causes the insulated bar at the preceding station to be coupled up to its battery, so that when a following train arrives at that station the line clear signal will be given to it.

A.D. 1873, January 29.—No. 345.

MARKHAM, RICHARD JAMES, residing at No. 132, Upper Kennington Lane, in the county of Surrey.—“Improvements in wheels.”

One wheel or wheels travelling or moving in the inner and outer flange or inside of a larger wheel, the small wheel or wheels moving round, and with a shaft or axle. The combined wheels form a railway or travelling way of themselves, by which means one fourth or more of motive power is gained.

A.D. 1873, January 29.—No. 346.

MIDDLEHURST, JOHN, of 56, Tillotson Street, in the township of West Derby, and borough of Liverpool, in the county of Lancaster, plumber, and MIDDLEHURST, JAMES, of the township of Rainford, in the county of Lancaster, brewer's clerk.—“An improvement by mechanical means of the process of the ingathering of the potato crop and other roots, and at the same time cleansing the roots so gathered from the adhering soil, and depositing them in hampers or other receivers for ready storing.”

Our invention is an agricultural implement intending a mechanical means of gathering all descriptions of roots, chiefly the potato, and cleansing them in the process of gathering. The fore part of the implement is a share or cutter passing through the soil below the roots. The soil and roots pass upon a grating, the whole carried onward by prongs or forks moved by the carrying wheels of the implement. In the motion and progress the soil falls between the bars to the ground. On attaining the end of the grating, the roots fall into a vibrating riddle, where the cleansing is finished, and they are then deposited in hampers, or by a shoot directed as desired upon the ground.

The implement will be valuable also as a cultivator, turning up the soil, opening it to the atmosphere, pulverising it, and cleansing it from stones and weeds.

A.D. 1873, January 29.—No. 347.

YOUNG, GEORGE, of Grangemouth, in the county of Stirling, North Britain.—“Improvements in lamp lanterns and in the lenses used therein, the same being also applicable to lighthouses.”

The features of novelty which constitute this invention are, the arrangement for supplying air to the interiors of the lanterns and the obscuring of the lenses.

A.D. 1873, January 29.—No. 348.

TODD, ROBERT, of Kendal, mechanic, and BRAITHWAITE, JOHN CARTMELL, of Kendal, in the county of Westmorland, carpet manufacturer.—“The manufacture of improved Kendal tapestry carpeting with any number of weft shoots of woollen, linen, or cotton.”

The alteration of the ordinary loom so as to use only one draught board of the jacquard apparatus & one treadle only, in place of two each as formerly. The causing the barrell to turn once for every shoot of weft thrown in, and the substitution of a set of heald-gears worked from the jacquard in place of two planes, thus rendering it possible to employ any number of different wefting shoots so as to produce & sustain any or all of them at will at the same time along any given straight line that may be drawn upon the surface of the cloth from selvedge to selvedge where it has been possible heretofore to show on the surface only two wefting shoots at one time, and to accomplish this without any addition to the warps now used.

A.D. 1873, January 29.—No. 349.

SEARS, HENRY BEAUFORT, of Liverpool, in the county of Lancaster, merchant.—“Improvements in and “connected with apparatus for surfacing mill and other stones.”

This relates to machines in which diamonds or hard mineral substances are used for surfacing or dressing millstones before being furrowed, rice cleaning stones, and flat, curved, or other stones for building or other purposes or operations, and consists,—

First, In employing a tool composed of a series of two, three, or more diamonds, set at such distances apart that the following diamond never acts in the same groove as the one preceeding it, but acts in the ridge between two cuts. Said tool may be made to travel in straight, curved, convolute, or other lines.

Second. In adjusting the series of diamonds mentioned under the above first head at varying depths in relation to the stone to be surfaced; that is to say, the second diamond deeper than the first, the third deeper than the second, and so on.

Third. Of an apparatus for surfacing stone. The above described tool, which is caused to move spirally over the stone or stones, consists of one, two, or more slides, secured to and made to rotate with a free ended spindle. The tool carriers are moved automaticaly on the said slides. The stone is placed under or opposite the slides in an adjusting frame. Speed cones and a screw to move the belt thereon are used to maintain uniformity of speed of the tool over the whole surface of the stone or stones.

A.D. 1873, January 29.—No. 350.

FAIRCLOUGH, JOHN, and FAIRCLOUGH, HENRY, of Warrington, in the county of Lancaster, corn millers.—“Improvements in apparatus for separating flour from middlings or sharps.”

A vibrating or shaking screen receives the middlings or sharps on its upper surface. The flour is caused to pass through by the motion of the screen and the action of travelling or moving brushes rubbing is underside clean.

When it is desired to free the flour and middlings from dust a current of air is employed. This passes through the vibrating screen during the separation of the flour, and carries the dust in mechanical suspension to zig zag depositing boards in a chamber.

A.D. 1873, January 29.—No. 351.

HASELTINE, GEORGE, of the “International Patent Office,” Southampton Buildings, London.—(*A communication from Henry Julius Smith, of Boston, Massachusetts, United States of America.*)—“Improvements “in submarine torpedo launches, and in apparatus connected therewith.”

The launch herein described is designed to be navigated under water, and with that end in view I have built it in what is known as the “cigar” shape. It is divided by bulkheads into three compartments, viz., the forward compartment or the torpedo proper, the stern compartment carrying the propelling and steering apparatus, and the middle compartment carrying the reservoir in which is confined the motive power, and also an insulated wire coiled upon a reel, by means of which electrical communication may be established between the launch and the shore. The launch has a keel and a rudder. The stern and forward compartments are water-tight. The middle compartment is open. The launch with its contents is much to heavy to float. To keep it from sinking to the bottom, a float is employed buoying the launch until detached. Use is also made of the float to regulate the depth under water at which the explosion shall take place.

A.D. 1873, January 29.—No. 352.

SMITH, SPENCER, of No. 204, High Holborn, in the county of Middlesex, engineer.—“Improvements in “apparatus for shewing the number of passengers by public or other conveyances, and for enabling the “amounts of their fares to be checked, which apparatus is applicable also for checking the attendances of “workmen and others at workshops and other places.”

This invention is designed to guard against fraud upon employers of money takers or workpeople by the use of counters or other tokens in conjunction with apparatus provided with chambers and receptacles.

The apparatus is constructed with a series of store-tubes, chambers, or places for unused counters or tokens, and a separate series of receptacles for such as may be withdrawn. Each store-tube or chamber is provided with a bottom slide or tray recessed to receive and draw out the counters or tokens one at a time, as may be

required. The receptacles are opened and closed as required by a slotted closing shaft connected by a link to a slotted check shaft for governing the operation of the trays or slides.

In some cases an upper and a lower slide suitably slotted and suitably connected may be employed, so as to operate together in lieu of the closing shaft or plug, and check bar or locking shaft above mentioned.

A.D. 1873, January 29.—No. 353.

DAVIS, CHARLES, of Pall Mall, in the county of Middlesex.—“Certain improvements in the method or means of preventing vessels or ships foundering or sinking at sea.”

The novelty of the invention consists in placing and securing about vessels or ships flexible air tight bags or compartments, which can be readily inflated through the medium of air pumps or fans in cases of imminent and sudden danger, thereby rendering such vessel buoyant.

A.D. 1873, January 29.—No. 354.

DAVIS, CHARLES, of Pall Mall, in the county of Middlesex.—“Improvements in the method or means of saving life or property at sea.”

The novelty of the invention consists in the simultaneous inflation in the case of danger at sea of a number of flexible bags or compartments, which when thrown out with lives or merchandize attached thereto will buoy up the same, so as to prevent their loss from sinking.

A.D. 1873, January 29.—No. 355.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from George Washington Dean, of the city, county, and state of New York, United States of America.*)—“Improvements in sifting shovels.”

This invention relates to shovels for sifting ashes, coals, or other substances, and consists in constructing the bottom of the shovel of wire, the wires being attached to the shovel frame by turning over the ends so as to hook over the edge of recesses or notches at the front end of the frame, and in apertures at the other end. There may be one or more series of apertures and notches at both ends of the frame, so that the distance between the wires may be readily adjusted.

A.D. 1873, January 29.—No. 356.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Robert Hitchcock, John Morton Sigourney, and William Van Vranken Rosa, all of Watertown, county of Jefferson, state of New York, United States of America.*)—“Improvements in lamps for burning heavy oils.”

This invention is directed to the burning of heavy oils in lamps in such manner that a brilliant flame without smoke may be produced without requiring the use of a chimney. To the accomplishment of this object I have found the following instrumentalities requisite:—First, passages or ducts through which air may be conducted both to the exterior and interior of the flame; secondly, mechanism for impelling currents of air through these passages to both the exterior and interior of the flame; thirdly, a deflecting cap or cone placed over the wick with an aperture for the passage of the flame and so shaped as to direct the external impelled current of air to impinge upon the exterior of the flame.

A.D. 1873, January 29.—No. 357.

LEACH, GEORGE, of Leeds, in the county of York, engineer.—“Improvements in machinery for preparing and carding wool.”

The object of this invention is to secure a more evenly and perfectly carded fleece than heretofore for the formation of condensed slivers of wool or spun yarn and thread.

A.D. 1873, January 29.—No. 358.

LEACH, GEORGE, of Leeds, in the county of York, engineer.—“Improvements in the construction and arrangement of apparatus or appliances to be used on board fishing vessels for facilitating the operation of sea-fishing.”

The principal object of this invention is to dispense with a great part of the manual labour heretofore necessary in sea fishing with very long nets, and to substitute therefor mechanical appliances, which may be driven by steam power.

A.D. 1873, January 29.—No. 359.

LEACH, GEORGE, of Leeds, in the county of York, engineer.—“Improvements in machinery for preparing wool.”

This invention relates to improvements in the machinery used in preparing wool after it has been opened in the willow, and converting it into laps ready for the carding engine.

A.D. 1873, January 30.—No. 360.

MURDOCH, HUNTER, HENRY, of No. 7, Staple Inn, in the county of Middlesex, patent agent.—(*A communication from Baron Victor de Rutenberg, of Paris, France.*)—“An improved explosive powder or compound, and the mode of preparing the same.”

This invention consists in mixing randanite with nitro-glycerine in order to produce an improved explosive powder. Randanite, which is a hydrated silica, was first discovered at Randanne, in France.

According to this invention the randanite is first dried and then roasted at a light red heat. It is then reduced to powder and sifted, and is ready for use as an absorbent for nitro-glycerine. Should, however, the randanite used be very impure, it should before being treated as described be washed in an acid solution.

The improved explosive powder is made by mixing the prepared randanite with nitro-glycerine by pouring the nitro-glycerine gradually upon a quantity of the prepared randanite upon a surface coated with gutta percha or soft metal, and stirring the mixture with a wooden spoon or slice. Or the mixing might be effected in a mixing machine.

A.D. 1873, January 30.—No. 361.

CLARK, JOHN, of 8, Belmont Terrace, parish of Kensington, county of Middlesex, engineer.—“Improvements in railway breaks.”

I fit a diagonal lever to force a break block upon each side of the carriage wheels. The said levers are operated by a chain along the train acting through a pulley and diagonal struts in the centre of each carriage.

A.D. 1873, January 30.—No. 362.

DICK, WILLIAM BRUCE, of Glasgow, in the county of Lanark, North Britain, merchant.—“Improvements in apparatus for extinguishing fires.”

This invention relates to fire extinguishing apparatus of the kind in which carbonic acid gas is mixed with or dissolved in water. A bottle of glass or other easily broken material is provided for containing the acid, and is by preference formed with indentations in its side or bottom, or both, to facilitate its being broken. This acid bottle is placed on a bottom support which is rigidly fixed to the top or sides of the vessel, and which is furnished with one or more hard points capable of breaking the glass on the application of sufficient pressure or percussion. The bottle is held firmly on its support by a cap, which also is furnished with one or more hard points, and which is fixed to a rod passing out through a stuffing box in the top of the vessel, and which is struck with a small mallet or other convenient instrument, in order to break the acid bottle.

A.D. 1873, January 30.—No. 363.

HUXTABLE, JOHN, of High Bray, in the county of Devon.—“An improved turn-wrest plough.”

This consists of a turn-wrest plough, with share lock and share adjustment arrangement. The hand lever also turns the furrow wheel.

A.D. 1873, January 30.—No. 364.

PEACOCK, GEORGE, of Regent House, Starcross, in the county of Devon, shipowner.—“Improvements in chain cables.”

In making chain cables according to my invention the links are welded in the usual manner, but instead of being in the ordinary oval shape and provided with studs extending across their middle or central portion, they are closed in the middle and formed into eyes at each end, and an oval band or hoop of iron is welded around the said closed or central portion of the link. The interstices at this closed portion of the link within and adjacent to the ring are filled with some metal or alloy, which will protect the link from oxidation and give it a smooth and finished appearance.

A.D. 1873, January 30.—No. 365.

PATERSON, JAMES, the younger, of Greenock, in the county of Renfrew, North Britain.—“An improved steam-trap.”

The feature of novelty which constitutes this invention is the arrangement of steam trap having the valves reversed.

A.D. 1873, January 30.—No. 366.

PROUSE, ROBERT SAUNDERS, of Liverpool, in the county of Lancaster, ship owner, and DUKE, HENRY, of the same place, ship smith.—“Improvements in axles and axle boxes for wheeled vehicles.”

Each axle is made in two lengths, and an axle box of the length of the axle from hub to hub of the wheels is provided. Each length of axle has a collar or boss thereon which fits in a corresponding recess in the axle box; lateral movement is thereby prevented. The axle box in its best form is made in two halves jointed together. Chambers for oil are constructed, and separate bearings and hub covers provided.

A.D. 1873, January 30.—No. 367.

BENNETT, JOSEPH, of Birkenhead, in the county of Chester, engineer.—“Improvements in feed water heating apparatus for steam boilers.”

This consists essentially in leading the pipe through which the feed water is supplied to the boiler through the ash pit as near to the fire bars as may be convenient, thence through or over the bridge, and afterwards upwards vertically, or nearly so, in the fire box, combustion chamber or space for heating gases, into the boiler under the water line. A perforated check valve is applied to the end of the pipe if desired.

A.D. 1873, January 30.—No. 368.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from Louis Laurette, of Paris, France.*)—“Improvements in the manufacture of artificial stone for building and other purposes.”

I make blocks for building purposes, tiles, and fire bricks from blast furnace slag which is first reduced to a coarse sand and then to powder, or sifted and afterwards mixed with suitable binding materials, such as hydraulic or other lime or cement.

The materials thus mixed are then pressed, while moist, into the form desired, and when hard may be cut, sawn, turned, or carved.

By adding coloring matters artificial marbles and variegated stones may be produced.

A.D. 1873, January 30.—No. 369.

ELEY, WILLIAM THOMAS, of the firm of Eley Brothers, ammunition manufacturers, of Gray's Inn Road, in the county of Middlesex.—“Improvements in ‘boxer’ breech loading and other cartridge cases.”

According to these improvements the base cup of the cartridge case is pierced with one or more holes of any suitable shape (for example, four circular ones) at equal distances apart near the edge, the object of which is to allow the base cup to expand directly the discharge takes place to the size of the chamber of the gun or rifle, by which the cutting or partial severance above the base cup of the thin coiled metal or paper which forms the case is avoided.

Sometimes the perforations sever the edge of the base cup.

A.D. 1873, January 30.—No. 370.

RICHARDSON, JOHN, foreman, and WATSON, JOSEPH, foreman, both of Gateshead upon Tyne, in the county of Durham.—“Improvements in puddling and rolling mill furnaces.”

To economize fuel and save the necessity of repairs, instead of making the fire place square or rectangular as heretofore, and the puddling floor or heating chamber and the passage over the fire bridge straight or formed of straight lines, the angles of the fire place are cut off and the parts curved.

A.D. 1873, January 30.—No. 371.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Albert Francis Johnson, of Parkville, Long Island, United States of America.*)—“Improvements in fire-alarm and water supply apparatus for preventing conflagrations.”

This invention relates to extinguishing fires in cities and towns and preventing the occurrence of conflagrations, and consists, first, in an automatic fire alarm which is set in motion by the excess of heat in the building or apartment in which a fire breaks out, and through the mediums of an ordinary telegraph instrument and telegraph wires, indicates at any desired number of stations of the fire department the occurrence of such fire and the exact locality thereof; and, secondly, a water supply, whereby the water is conducted to every part of each building by means of stationary steam engines and force pumps operating through a system of pipes in such a manner that a stream or streams of water may instantly and without loss of time be thrown upon any fire that may break out; the two parts together forming a complete system for extinguishing fires and preventing conflagrations, in-as-much as the alarm is given and the water can be applied without loss of time, and before the fire has had time to spread to adjacent buildings.

A.D. 1873, January 30.—No. 372.

ONES, DAVID, of Inverness, in the county of Inverness, in Scotland, mechanical engineer.—“Improvements in apparatus for forcing-in liquids or fluids, applicable to forcing inflammable fluid or liquid into furnaces of various kinds, and at various pressures, whether of kind or degree.”

This apparatus consists of a pipe or passage for steam or air within a pipe or passage for fluid or liquid, outside of which is a pipe or passage for air. These are worked in connection with proper stop cocks or valves. Any or the whole of the above pipes or passages can be changed in position, or can be used without the outside pipe or passage. Different sizes can be made use of.

A.D. 1873, January 30.—No. 373.

DWARDS, JOHN CHARLES, engineer, of the Sun Iron Works, Manchester, and TAFT, JOHN, engineer, of the Sun Iron Works, Manchester.—“Improvements in machinery for preparing and cleaning cotton or other fibrous material.”

The improvements consist in the employment in self-acting regulators of strap guides geared up by means of quadrants and pinions to a worm on a shaft carrying a clutch box, one part of which turns loose when out of gear and is in communication with the feed motion and capable of being readily taken in and out of gear, so that a change of position relatively to the fast portion will alter the speed of the feed, such alteration being shown by means of an index. And in the employment of weighted arms attached to the feed roller bearings fixed at such angles as will incline the roller to the face of the shell during delivery. Likewise in the employment of a corrugated bar or plate and roller or rollers as a feed motion, each bar or plate to be placed either above or below the roller or rollers. Also in the employment of a lubricator for the revolving parts in preparing machines, formed of a ring or dasher on the shaft outside the bearings, lifting the lubricant during motion to the top thereof, where is a passage communicating with the shaft, the supply of oil being kept in a reservoir or shell enclosing the dasher and the whole or part of the bearing, such lubricator being generally applicable.

A.D. 1873, January 31.—No. 374.

IRLING, JAMES, of Kilmarnock, in the county of Ayr, North Britain, locomotive engineer.—“Improvements in apparatus for working railway brakes.”

There are fitted to the carriages or waggons a set or sets of brake blocks so arranged as to be pressed on the wheels by springs or weights. Each carriage or waggon is fitted with a cylinder and piston, the rod of which is connected to the brake gear, and the piston is moved so as to relieve the brakes by a fluid under pressure, such as compressed air, admitted to the cylinder by piping. The cylinders are connected by piping to a reservoir, in which a sufficient pressure is maintained by pumps; and when the brakes are to be applied to the wheels the communication with the reservoir is closed by a valve, and a communication with the atmosphere at the same time opened, which action by relieving the pressure in the cylinders sets the springs or weights at liberty to act.

A.D. 1873, January 31.—No. 375.

EDGE, WILLIAM EDWARD, of No. 11, Wellington Street, Strand, in the county of Middlesex, patent agent.—(*A communication from Lucien Brunel-Bodin and I. Felix Brunel-Marchand, both of No. 64, Faubourg Martin, Paris, France.*)—“Improvements in machines or apparatus for blocking boots and half boots or ‘bottines.’”

This machine or apparatus is composed of a series of lever nippers, one for the foot, one for heel, and one for the leg of the upper, all attached to a main shaping block, and each provided with a screw, by which when

the previously moistened upper is held between them they are made to retire successively from the block, carrying the leather with them and thereby stretching it over the block; the upper is thus left for a few minutes, during which it partially dries, taking the shape of the block in such a manner as to preserve such shape when it is removed.

A.D. 1873, January 31.—No. 376.

RYDILL, GEORGE, of Grove House, Dewsbury, in the county of York.—“Improvements in fuel economizers, feed water heaters, and surface condensers, also for heating air and for other purposes.”

My improved invention consists in utilizing the steam or steam and air from condensing and other engines, for more effectually preserving the heat in steam cylinders, also for heating the feed water and condensing steam, also applicable for heating air, and for other purposes.

A.D. 1873, January 31.—No. 377.

NEILL, JOHN, of Greenock, in the county of Renfrew, North Britain, sugar refiner.—“Improvements in the making of lump, loaf, or block sugar, and in the machinery employed therefor.”

The feature of novelty which constitutes this invention is the mode of forming the sugar into blocks, and the machinery employed for effecting that operation.

A.D. 1873, January 31.—No. 378.

IBBETSON, JAMES, of Leeds, in the county of York.—“Improvements in lavanting machines used in the manufacture of leather, artificial or otherwise.”

A lavanting wheel with brackets on its rim; headstocks are fastened to rim, carrying adjustable rollers. The lavanting wheel framework carries a swing table, on which the material to be operated upon is placed; a cam, eccentric, or equivalents, actuated by a treadle or foot lever, brings the table to its work. The rollers are kept to their work by springs; for fluting, rollers are used of wood or metal.

A.D. 1873, January 31.—No. 379.

KAY, THOMAS BISPHAM, of Bolton le Moors, in the county of Lancaster, mechanical engineer, and MILLS, FREDERICK, of Heywood, in the same county, machine maker.—“Improvements in carding engines for carding cotton and other fibrous materials.”

By this invention the mechanism is simplified and the operations of raising, turning, stripping, grinding, and lowering each flat are accomplished with more expedition and accuracy than heretofore.

A.D. 1873, January 31.—No. 380.

LYNE, THOMAS, of Earls Colne, in the county of Essex.—“An improved apparatus for moulding bricks.”

A frame of moulds with slides, upon which it moves up and down by means of a lever or other contrivance. Also a moulding table, through which the above slides work, having solid blocks.

The bricks by this arrangement are left clear and free of the mould, the latter being lowered down and the bricks carried away in the usual manner.

Also a contrivance for lubricating the interior of each of the moulds.

A.D. 1873, January 31.—No. 381.

STRANGE, LUMISDEN, of 3, Westminster Chambers, Victoria Street.—(*A communication from John Alexander Cameron and John Frier, both of Madras, India.*)—“Improvements in presses for pressing cotton and other materials into bales.”

* The pitch of the screw of the press is different at different parts of its length, so as to give a slower speed and greater power when required. Means of withdrawing the follower are described.

A.D. 1873, January 31.—No. 382.

RHODES, JOHN HENRY, of Freedom Road, Freedom Terrace, Sheffield, in the county of York.—“An improved liqueur frame or stand for containing liqueur and other bottles.”

The bottles are suspended from the stand on pivots.

A.D. 1873, January 31.—No. 383.

DUNCAN, GEORGE, and WILSON, WILLIAM ASHLEY, of Liverpool, in the county of Lancaster, engineers.—“Improvements in printing machines.”

This consists in placing type or stereotype on the internal surface of a segmental plate and employing revolving and rotating impression cylinders, each with grippers to bring the sheets in contact with the type.

Two sets may be used for “perfecting” printing.

A.D. 1873, January 31.—No. 384.

FOSTER, WILLIAM, of the firm of John Foster and Son, of Black Dike Mills, Queensbury, near Bradford, in the county of York, alpaca, mohair, and worsted spinners and manufacturers.—“Improvements in or applicable to machinery or apparatus for preparing wool or other fibrous substances for combing or spinning.”

This invention relates to “preparers” or “gill-boxes” for straightening and forming the fibres into slivers, in the effecting of which the fibres pass through several machines called “sheeters.”

The improvements consist in dispensing with the sheets now used, and in substitution thereof I employ a rotary drum or cylinder to receive the wool or fibre from the fluted feed rollers and wind the same upon its surface during a series of revolutions, forming a lap. The drum has a moveable portion or flap opening outward and actuated through gearing at a determined time, for the purpose of severing the lap and transferring one end thereof to a “porcupine” or spiked roller placed in front of the ordinary feed apron of the next or succeeding machine.

A.D. 1873, January 31.—No. 385.

BROEL, JOSEPH, of South Kensington, in the county of Middlesex, gentleman.—“Improvements in apparatus for lighting and heating.”

This invention relates to a peculiar arrangement of apparatus for producing an inflammable mixture of air and the vapour of volatile hydrocarbons to be used as a gas for lighting and heating purposes, in combination with which I employ an automatic regulator for regulating the production of such inflammable mixture in accordance with the rate of consumption for the time being.

A.D. 1873, January 31.—No. 386.

JONES, EDWARD, of Birmingham, in the county of Warwick, mechanical engineer.—“Improvements in cartridges.”

This invention consists in dispensing with the metal cap chamber of ordinary cartridges by forming the cap chamber in the wad itself by pressure or otherwise.

A.D. 1873, January 31.—No. 387.

HAMILTON, JAMES BAILLIE, of University College, Oxford.—“Improvements in the construction of reed pipes for organs.”

The pipe is closed at both ends, and the escapement of wind and sound is at the reed itself; one face of the reed is exposed to the open air, and the action of the wind on the reed is direct, being brought thereon either by a nozzle or by merely admitting air into the closed pipe.

A.D. 1873, February 1.—No. 388.

HEATON, REUBEN GEORGE, trading under the name of Reuben Heaton, manufacturer, of Birmingham, in the county of Warwick.—“A new compound multiplying fishing reel, with revolving handle plate.”

The novelty of this invention consists in so arranging the parts of reels for fishing tackle as to increase the multiplying power, and at the same time simplifying the construction and action by the use of an outside revolving handle plate.

A.D. 1873, February 1.—No. 389.

PLATT, GEORGE, of the firm of George Platt and Co., chandelier and fancy gas fitting manufacturers, of Birmingham, in the county of Warwick.—“A new improved mode of imparting ornamental effect to chandeliers, branches, and other ornamental gas fittings, and which said improvements are also applicable to chandelier and general fittings, the means of illumination being otherwise than that of gas.”

The novelty of this invention consists in the application of glass or other transparent or semi transparent material placed between the scroll, filagree, or other open metal parts of chandeliers, branches, and other fittings adapted for illumination.

A.D. 1873, February 1.—No. 390.

FOX, HOWARD BUSBY, of Oxtou, in the county of Chester.—“Improvements in and applicable to water-proof garments.”

The features of novelty which constitute this invention consist in forming waterproof garments such as coats, jackets, cloaks, capes, gaiters, leggings, and other analogous articles with a pipe, cord, or waterway so placed that rain or other moisture running down the surface will be directed or led to one or more distinct points and run away clear of the wearer's knees and undercloths.

A.D. 1873, February 1.—No. 391.

GRINDROD, JOHN TROUGHTON, of Liverpool, in the county of Lancaster.—“Improvements in floating wrecks and submerged vessels, being sailing or steam ships, and other sunken bodies; and in apparatus employed therefor.”

The features of novelty which constitute this invention consist in expelling, displacing, or dispersing the water contained in the sunken vessel to such an extent that the vessel herself will become the lifting power and float to the surface by herself. To carry out this invention use is made of air or gas receptacles, or cases, from which all air or gas has been exhausted. These air or gas receptacles, or cases are of a novel construction, namely, they are made tubular, or oval, or of such shape as to give a maximum amount of strength, and they must be stayed at intervals with strengthening bands, and of such size that they can be easily distended, also where requisite, of shape to adapt themselves to the shape of the portion of the vessel to which they are applied. These cases are connected by means of pipes, or otherwise to an air pump, which drives atmospheric air or gas into them, thereby inflating the cases and expelling the water from the interior of the sunken vessel. Should there be cracks or leaks, the cases will be forced into such cracks or leaks by means of the expansive force employed. When a sufficient number of these air cases have been employed the vessel will float by herself.

A.D. 1873, February 1.—No. 392.

GALL, CHARLES, of Halifax, in the county of York, engineer.—“Improvements in steam boiler and other furnaces, and apparatus connected therewith.”

The objects of this invention are,—

Firstly. The construction, application, and use of mechanism for the purpose of ensuring a supply of air to the furnaces of steam boilers when fuel is applied, and the self acting withdrawal or shutting off the atmospheric supply by the closing of the furnace door as the fire becomes bright.

Secondly. The construction of grate bars in such manner as that the same are preserved from the destructive action of the fire, also that the bars so constructed contribute to the more entire combustion of fuel, and assist in the combustion or condensation of the smoke arising from such furnaces.”

A.D. 1873, February 1.—No. 393.

MCDUGALL, JOHN, of the firm of McDougall Brothers, of Manchester and London, manufacturing chemists.—“Improvements in the manufacture of manures.”

This invention has for its object improvements in the manufacture of manures.

I treat phosphatic substances with sulphuric acid to render them soluble and remove the soluble constituents (either whole or in part) by washing, filtration, or other convenient method, and into the resulting solution I pass liquids, gases, vapours containing ammonia, and the resulting product may be concentrated or dried by exposure or heat.

Or after passing ammonia into the resulting solution as herein described, I allow the precipitated phosphate of lime to subside and separate the liquid, which can be evaporated into a salt. The precipitated phosphate can be dried for use or incorporated in the semi liquid state into the manufacture of super-phosphates as hereafter described. The solution obtained as herein described may be used for the removal of ammonia in coal gas or other gases arising from the destructive distillation of carbonaceous substances, by employing it in the ordinary washers or scrubbers in use in gas works, or by other convenient method.

I also treat phosphatic substances with hydrochloric acid in any desired quantity to render them soluble

if sufficient of the acid has been added to convert the phosphate into the liquid state, any insoluble residue may or may not be removed by subsidence or other convenient method; and into the mass or liquid I pass gases or vapours containing ammonia other than coal gas. The resulting product can be concentrated by heat or exposure.

Or in treating the phosphatic substances with hydrochloric acid as above described, I take care the acid is of reduced strength, or if acid of full strength is used, the resulting solution may be diluted, so that after passing in the gases or vapours containing ammonia, the resulting solution shall not be too dense to allow the soluble phosphate that has become changed into precipitated phosphate to subside, so that the liquid may be run off and evaporated into a salt and the precipitated phosphate dried for use.

In the manufacture of super-phosphate of lime for manure, when sulphuric acid is used, it is customary to dilute the acid with water when bringing it into contact with the phosphate to be acted upon, by which means a drier product is obtained than if acid alone were employed. This water, either whole or in part, I substitute with liquids or semi-liquids containing ammonia or other useful manurial ingredients, and so utilize them, at the same time obtaining a manure of sufficient dryness. If the liquid used requires the addition of an acid for its proper utilization, the acid must be added to it before using or extra acid added to the phosphate.

After the removal of the soluble constituents from the phosphatic substances treated with sulphuric acid as already described, the residue will consist to a large extent of sulphate of lime, this sulphate of lime, or sulphate of lime obtained by other methods or in a natural state, or chloride of calcium, I treat with liquids containing ammonia, and whilst agitated pass in carbonic acid, which causes the decomposition of the sulphates or chlorides, and liberates the acids to combine with the ammonia. After subsidence, I separate the resulting solution and evaporate it into a salt.

The carbonic acid generated in the treatment with an acid of phosphatic substances containing carbonate of lime may be utilized for this purpose, or may be derived from other convenient source.

When it is desirable to convert the precipitated phosphates obtained by the foregoing process again into soluble phosphates, either wholly or in part, I add sulphuric or any suitable acid to effect this purpose.

A.D. 1873, February 1.—No. 394.

MORRIS, THOMAS SHEWELL, and SKINNER, GEORGE, both of the Royal Exchange, in the city of London.—“An improved caster for furniture, also applicable to other purposes.”

The frame of the caster is formed of the ordinary socket or flat plate, but the lower part thereof is cast or formed with a hollow cylindrical projection or short tube furnished with two, three, or more lugs or claws for receiving a sphere or ball which forms the roller of the caster.

A.D. 1873, February 1.—No. 395.

PETTIFER, CLEMENT, of New Wortley, near Leeds, in the county of York, contractor.—“Improvements in apparatus for producing a blast or forcing air, and which apparatus is applicable to the ventilation of mines, buildings, drains, ships, and other purposes.”

This invention relates to employing water under pressure for producing a blast, or forcing air. Water under pressure coming through a pipe passes through a rose, the bottom of which is made with small holes, and underneath these holes wires are fixed, for the purpose of cutting or dividing the water passing through the holes; the rose is fitted in a cylinder having air holes at the top, and a suitable air space is left between the rose and the cylinder. Atmospheric air coming through the air holes and space strikes amongst the divided or cut water, and is forced by the pressure of the water through an air pipe, and the water escapes through a discharge pipe made at the bottom of the cylinder or air pipe.

A.D. 1873, February 1.—No. 396.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(A communication from James Parkyn, of Montreal, Canada.)—“Improvements in machinery for separating the dust, bran, and germs from the granulated portions of wheat.”

This invention has reference to improvements in that class of machines used for separating the dust, bran, and germ of the wheat from the granulated portions known as “middlings.” It is designed to provide a better and more equally distributed current of air, and one capable of adjustment, thereby increasing the quantity and quality of the work done by the machine. It also provides a brush for acting on the bolting cloth in a more simple and efficient manner than those at present in use.

A.D. 1873, February 1.—No. 397.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from Louis Hannart and Theophile Mamelzer, both of Paris, France.*)—"An improved device "for ticketing shop goods and for other purposes."

This device for ticketing goods in shops, holding railway or other tickets, and many other purposes, consists of a clip in which the ticket is inserted, combined with a straight or bent pin or hook for attaching it to the dress or article.

Several clips may be attached to the same pin, and they may be made in the form of figures when used for marking goods, so as to dispense with tickets.

APPENDIX
TO
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bridgments open to public inspection before the expiration of the term of six months (in consequence of the Patentees having filed their Final Specifications), and also the Abridgments of Complete Specifications received from July 26 to August 1, 1873. These Abridgments will be subsequently printed in the body of the book, in order to preserve the numerical and chronological arrangement.

A.D. 1873, February 3.—No. 403.

EDGE, WILLIAM EDWARD, of No. 11, Wellington Street, Strand, in the county of Middlesex, patent gent.—(*A communication from Jean Constant Michelet, of Dieppe (Seine Inférieure), France.*)—"A new system for converting a slow alternate circular motion into a rapid continuous circular motion."

This invention is a practical solution of a problem of transformation of motion, a solution independent of the nature of the motor as well as of its applications, but is here described in its application to a blower or fast fan and field-forgé.

A lever being fixed on a lower shaft and an arc or segment of a circle being set on the same shaft, each movement of the lever to the right or to the left will cause a corresponding movement of the segment of a circle.

Upon this segment of a circle are fixed two belts or straps winding on the upper shaft, to which they give an alternate circular motion.

Upon the upper shaft is keyed a very light wheel which will make two revolutions and a half for each simple movement of the lever.

Upon the wheel is fixed the end of a cord winding two and a half times round it, enveloping a cylinder passing over guide rollers, enveloping a second cylinder, and coming back upon the light wheel, its end being secured to a stretcher.

The relation of the radii between cylinder and light wheel is such that the cylinder makes from 20 to 25 revolutions for each simple movement of the lever.

The circular motion is rendered continuous as follows :

The cylinders are moved with an alternate circular motion. The shaft of the blower must follow the continuous circular motion, for which purpose the cylinders are loose on this blower shaft, the momentary gearing or clutching with which is effected by means of two catches; when the movement of one of the cylinders takes place in the direction of the continuous rotation of the blower shaft, the catch corresponding with this cylinder penetrates into openings presented by the inner face of this cylinder, at the same time that the catch at the opposite end is driven out of similar openings in the other cylinder, and the continuity of the circular movement is thus obtained without appreciable effort.

A.D. 1873, February 3.—No. 404.

ANDREWS, JOHN CLARK, of Crewkerne, in the county of Somerset, manager.—"Improved apparatus for heating water or other liquids by the direct action of steam."

The object of this invention is, first, to economize fuel and utilize the heat of the steam; second, to cause a proper and continuous circulation of the water or other liquid that is to be heated; and third, to prevent the noise and rattle which usually takes place when steam is injected under pressure into a liquid.

A.D. 1873, February 3.—No. 405.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Giovanni Pagliari of Paris, in the Republic of France, chemist.*)—"Improvements in the treatment of essential oils, with a view to their employment as fuel for heating purposes."

This invention consists in solidifying essential oils, and more especially petroleum, with a view to their application as fuel to heating purposes by bringing such oils in contact with solid porous bodies having the property of absorbing essential oils, such, for example, as wood, sawdust, pumice stone, and more particularly coke.

It is further proposed to combine essential oils (especially petroleum) with other inflammable substances
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which may also be used as fuel, for example, with oils of the same inflammable nature, in a solid or concrete form, white resin, colaphany, and such like substances, and to obtain a homogenous mixture with petroleum oil for the purposes of heating.

A.D. 1873, February 3.—No. 406.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Jean Baptiste Ferdinand Masson, of Paris, in the Republic of France.*)—"Improvements in the manufacture of tin foil, and in the covering of other metals with tin, also in the machinery or apparatus employed therein."

This invention relates to a peculiar process of and apparatus for manufacturing at one and the same time and in one apparatus two sheets of tin foil of any desired thickness, or of coating, if desired, a plate or sheet of lead or other metal with tin by allowing the molten tin to adhere to the sides of a prepared surface which is drawn up vertically through the bath of tin being divided for that purpose. If a sheet of scoured metal be so drawn up the tin will adhere permanently thereto and thus coat it.

A.D. 1873, February 3.—No. 407.

DONATH, FERDINAND AUGUST HERMANN, and JASPER, CARL ERDMANN FRIEDRICH, both of Dresden, Saxony.—"Improvements in the manufacture of cigars, and in machinery and apparatus therefor."

The first part of our invention relates to a filler making machine. The tobacco from which the fillers are to be made is placed in a trough and thence conveyed into a channel in which it is fed towards a cutter. The cut off tobacco first drops on two movable hinged gates, it is then conveyed into a strap and a movable rolling board. Before the rolling operation commences the attendant must have placed the binder on the strap. The second part of our invention relate to a method of moulding the points of the cigar fillers and apparatus to be applied for this purpose. One end of the filler is introduced into a recess between two dies. The dies are closed and the filler end compressed.

A.D. 1873, February 4.—No. 410.

MEWBURN, JOHN CLAYTON, of 169, Fleet Street, in the city of London, patent agent and consulting engineer.—(*A communication from Victor Dubreuil, of Roubaix, France.*)—"Improvements in the means or apparatus for lubricating vertical spindles or shafts in spinning or other machines."

This Provisional Specification describes the making of the collars or bearings of spindles and vertical shafts with a screw thread instead of smooth as heretofore. The rotation tends to make the oil rise up the spirals, so that the lubrication is, as it were, constant, whereas when the collars or bearings are smooth, the oil soon descends to the bottom.

A.D. 1873, February 4.—No. 412.

SIMON, HENRY, of Manchester, in the county of Lancaster, civil engineer.—(*A communication from Fredrich Ludwig August Büttner, civil engineer, of Aachen.*)—"Improvements in tubular boilers and heating tubes."

The main principal feature of this invention is, fixing tubes on one side only, so as to have them communicating on that side only, and the promotion of the circulation of the water through each tube either by small interior tubes or by inserting inside sheet iron strips or diaphragms, and dividing the communication chamber by partitions in such a way as to oblige the water to pass through the whole series of tubes and along all the zig zags established in the boiler.

A.D. 1873, February 5.—No. 431.

MILLS, BENJAMIN JOSEPH BARNARD, of the firm of Harris and Mills, of 35, Southampton Buildings, in the county of Middlesex, patent agent.—(*A communication from James Leander Cathcart, of Washington, in the district of Columbia, mechanical engineer and James Scott Negley, of Pittsburgh, in the state of Pennsylvania, gentleman, both in the United States of America.*)—"Improvements in apparatus connected with screw propellers for ships and other vessels."

The invention consists, Firstly, in so connecting the propeller frame with the rudder that it may be moved simultaneously therewith, but to a less extent.

Secondly. In arranging and adapting the propeller frame to be permanently fixed in any position desired.

Thirdly. In connecting the rudder and propeller frame by adjustable and detachable connections.

Fourthly. In the construction of a universal joint employed to connect the engine shaft and the propeller shaft.

Fifthly. In appliances to facilitate the unshipping and replacing of the propeller.

Sixthly. In a device employed to brace and tie the arm of the propeller crane to the post thereof.

A.D. 1873, February 15.—No. 569.

PATISON, JOHN, of Airdrie, in the county of Lanark, North Britain, manufacturing chemist.—“Improvements in the destructive distillation of coal and shale for the production of illuminating gas, fuel, and oil and other products therefrom, and in the apparatus therefor.”

This invention consists of an improved mode and means of carrying on the permanent or continuous destructive distillation of coal or shale, or a mixture of these with other organic substances, or heated bricks, coke, scrap iron, or other such equivalent, for the production of said products and hydrocarbons for lighting, heating, and other purposes, by feeding the said materials to be heated into long cylindrical iron, clay, or other retorts capable of standing the great heat required for the particular gases or vapours being distilled over by them.

The retort is laid at an angle with close ends, and has the material to be treated (suitably broken up) charged or fed into a hopper or mouthpiece at the highest end, fitted with a tapered charging plug and weighted lever, which, when lifted by the operator, admits the charge and again closes the throat when let go. The materials thus charged into the throat, may, by a feeding screw fitted in it, be further fed into the upper end of the retort, which is itself fitted with a long screw shaft or shafts, having the screw formed to act as a continuous screw by angled radial blades fixed or formed on the spindles, and which, with angled teeth at the upper end, draw in and compress the material through the upper contracted end, and screw it slowly to the far lower end of the retort, loosening and stirring it to free the gaseous products in its course, while the destructive distillation is constantly going on, room being left at the top for their free exit at the highest part from one large pipe or several small ones for their subsequent purification, condensation, or other treatment and use in a usual manner; the residuum and solid carbon being discharged through a close duct at the lower end into water, or close vessels, or otherwise, for subsequent use in heating the retort, or for other purposes in a usual manner. First, and specially for distilling off the great part of the hydrocarbon compounds at low temperatures by these improvements from the coal and shale, or their mixture with other substances, iron retorts may be used and heated in the inside, by the admission or injection of superheated steam or other vapours or gases, maintained steadily at the lower temperature until the eliminated gases are exhausted from the material being treated. But secondly, and specially for the distillation of the said substances and their mixtures, for obtaining the greatest amount of illuminating or permanent gases, and freeing the residuum of all volatile matter, a much higher steady heat is employed, and the retorts are thus preferably formed of fire clay or other equivalent, and heated from the outside in a usual manner by fuel or gas heating close furnaces; and in this second case it is preferred to lead the vapours generated through highly heated bricks, coke, scrap iron, or other equivalent, in a close chamber or retort, so as to decompose the hydrocarbons, and thus eliminate or produce the greatest possible quantity of the permanent gases desired. The one end of each feeding and conducting screw shaft would pass out through a fluid tight stuffing box in one end of its respective retort, so as to be driven by gearing outside. When by the said first distillation (as at low temperature) the treatment is not carried on, so as to eliminate all the oils from the residuum, these residua could be run off while hot by a pipe and tap for the purpose, at the lowest part of the retort. To use and treat the nitrogeneous liquid products (obtained by the said first distillation at low temperature) they are neutralized with acids to form salts on evaporation in the usual manner; and to use the hydrocarbon oils, these may be distilled, condensed, refined, and purified by acids and alkalis, all in the usual manner. But these said crude hydrocarbon oils obtained by the first treatment, or such hydrocarbons obtained from other sources, may by another improvement be heated to 80° or 90° Fahrenheit and led by pipes controlled by taps from a suitable heating or other cistern above, through the lower part of the retort and the said highly heated residuum therein, so as by a second or double distillation to be decomposed or eliminated into the permanent or illuminating gases desired; and by another treatment this latter improved second or double distillation of the hydrocarbon oils may in like manner be performed or executed in ordinary retorts, as well as in the constant acting cylinders with feeding and conducting screw spindles revolving in them.

The final solid residuum or carbon obtained from any of these improved processes may subsequently be ground for blacking or used for charcoal or fuel for heating the retorts or for other ordinary heating purposes.

A.D. 1873, February 18.—No. 605.

ROLIN, ERNEST, of the firm Eugène Rolin et Ce., of Braine le Comte, (Belgique).—“An improved weighing machine.”

The improvements described in this Specification are effected by making the arms of the various levers square or at right angles with each other; by placing the mechanism outside of the platform or table; by

making the box or case of cast iron, serving at the same time as a seating or bed plate for the mechanism, and by an improved mode of blocking or wedging the weigh beam when not in use for weighing, and allowing the table to rest immovably on supports arranged for the purpose.

A.D. 1873, July 26.—No. 2552.

BAZIN, ERNEST, civil engineer and Chevalier of the National Order of the Legion of Honour, of No. 16, Place Vendome, Paris, France.—“Improvements in the construction of ships, and in their mode of “propulsion for facilitating navigation and augmenting speed.”

This invention consists in substituting a rolling system for the ordinary modes of propulsion, the cylindrical rollers or floats being in the form of a section of a vessel at midships and having circular keels, and being of large dimensions they are divided in the centre, so that they may be supported at that part as well as at the extremities.

These floating cylinders are animated with a rotary motion imparted to them by engines adapted to each roller.

The object of this part of the invention is to crush and as it were disaggregate the water opposing the floats and give passage to them, thus attenuating the forcible resistance which both wind and water present, by the pure and simple displacement thereof.

In conjunction with the rollers, and working simultaneously with them, are two four bladed screws, this combination producing the practical rolling on the water, and so attaining the requisite qualities for navigating the high seas.

A.D. 1873, July 29.—No. 2567.

LEECH, WILLIAM, of the firm of Johnston, Farquhar, and Leech, of 65, Moorgate Street, in the city of London, solicitors.—(*A communication from William Malpas, of Athelstane, near Adelaide, in the province of South Australia, gentleman.*)—“An improved method of preserving wood from the ravages of white ants and other insects, by the application of certain chemical solutions.”

These chemical solutions consist of the following: one pound of arsenious acid and one pound of carbonate of soda dissolved in four gallons of boiling water. In a separate vessel is dissolved sixteen pounds of sulphate of copper in sixteen gallons of hot or cold water. These solutions are then mixed together and poured upon the timber or wood to be preserved and in which it is thoroughly immersed, the solution being heated to a boiling point by a steam pipe.

In cases where the heating of the solution is not practicable, one gallon of cold water is mixed with sixteen ounces of sulphate of copper and one quarter of an ounce of arsenious acid and two coats are applied with a brush to the article or material to be preserved.

A.D. 1873, July 30.—No. 2583.

CLARK, WILLIAM, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from George Boucher de Boucherville, of Quebec, in the province of Quebec and Dominion of Canada.*)—“Improved apparatus for utilizing wave power for propelling vessels and other purposes.”

The object of the invention is to utilize the pitching and rolling motion of a ship or vessel on the water, for furnishing power for propelling the vessel and for other purposes, and it consists in the employment of one or more weighted floors or platforms suspended in the vessel in such a manner that the floor or platform may oscillate freely as the ship pitches backward and forward, which communicates motion to the propelling screw or wheel by means of mechanism.

A.D. 1873, July 31.—No. 2600.

HASELTINE, GEORGE, of the “International Patent Office,” Southampton Buildings, London, Doctor of Laws.—(*A communication from Charles Trinder Reynolds, Thomas Burns Hidden, Leonard Richardson, Edward Leslie Molyneux, and Aquila Rich, all of the firm of C. T. Reynolds & Co., of the city and state of New York, United States of America.*)—“Improvements in the preparation and packing of water-colors for “artists’ and other purposes.”

This invention is designed to provide an improved method of preparing and packing for sale transportation what are known in trade as water colors. The said invention consists in preparing and putting up the said colors in tablets or sheets on paste board, paper, or the like.

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Names printed in *Italic* are those of the persons by whom the inventions have been communicated to the applicants for Letters Patent. The consecutive numbers of the Applications, which are prefixed to the Abstracts contained in this volume, follow the names. The names distinguished by this addition (*App.*) belong to the Abstracts in the Appendixes. The Appendixes Nos. 32 to 52 were published with the corresponding weekly Nos. of the Chronological and Descriptive Index for the year 1872, and the Appendixes Nos. 1 to 5 with the weekly Nos. of the Index for the present year.]

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Broad, J., 515 (*App. 4.*) Applying poultices.
 Broel, J., 385, Air-gas.
 Brooks, J. W., 822 (*App. 36.*) Boots and shoes.
 Broomhead, G., 320, Wire.
 Brotherhood, P., 287, Propelling machinery.
 Broughton, J., 256, Fire-arms.
 Brown, W. M., 822 (*App. 36.*) Boots and shoes;
 1233 (*App. 40.*) Granulators; 1901 (*App. 48.*)
 Hydraulic hose.
 Browne, J. C., 277, Propelling vessels.
 Bruneaux, L., 1644 (*App. 45.*) Hydro-caloric meters.
 Brunel-Bodin, L., 375, Blocking boots.
 Brunel-Marchand, I. F., 375, Blocking boots.
 Buckley, S., 44, Pipe wrenches and cutters.
 Bull, T., 280, Washing machines.
 Bullock, A., 171, Preventing incrustation in steam-
 boilers.
 Bunster, C. E. W., 15, Aërial tramways.
 Buquoy, X., 2393 (*App. 2.*) Dredging machines.
 Burdon, W., 257, Steam vacuum pumps.
 Burgess, J., 307, Crochet needle handles.
 Burt, J. U., 57, Carriages.
 Burton, P., 47, Railway carriages.
 Büttner, F. E. A., 412 (*App. 5.*) Tubular boilers.

C.

Cameron, J. A., 381, Presses.
 Canning, Sir S., 120, Ships' telegraphic apparatus.
 Capewell, G. J., 64, Nail extractors.
 Cardon-Wamain, J. T., jun., 203, Fibres.
 Carmichael, H., 72, Bleaching, dyeing and washing.
 Carr, D. A., 344, Railway signals.
 Carrington, W. T. H., 156, Fire-places.
 Carty, B. F. Mc, 681 (*App. 35.*) Economizing fuel.
 Cathcart, J. L., 431 (*App. 5.*) Screw propellers.
 Cederholm, H. S., 1394 (*App. 42.*) Ships' logs.
 Chapman, L., 2281 (*App. 1.*) Rotary pumps.
 Charlesworth, G., 114, Weaving.
 Chislett, J. R., 87, Medical electricity.
 Chodzko, N. F. B. de, 124, Steam-boilers.
 Clark, A., 278, Metallic revolving shutters.
 Clark, A. M., 109, Condensing liquefiable matters;
 189, Velocipedes; 237, Railway switches and
 points; 320, Wire; 355, Sifting shovels; 368,
 Artificial stone; 397, Ticketing shop goods, &c.;
 1241 (*App. 3.*) Presses; 1428, (*App. 4.*) Fruit
 preserving cans, &c.; 2012 (*App. 49.*) Stone
 cutters; 2190 (*App. 52.*) Printing oil-cloth, &c.;
 2420 (*App. 3.*) Tooth brushes.
 Clark, E., 611 (*App. 34.*) Raising and lowering
 ships.
 Clark, G., 286, Metallic and other vessels.
 Clark, J., 361, Railway breaks.
 Clark, W., 2583 (*App. 5.*) Propelling ships.
 Clarke, T. A. W., 108, Crimping hair.
 Claughton, H. O., 13, Cart saddles.
 Clayton, G., 148, Miners' safety lamps.
 Clean, F. Mc, 41, Raising ships.
 Clure, W. B. Mc, 13, Cart saddles.
 Cochrane, H., 1187 (*App. 40.*) Knives and forks.
 Cocker, J., 1084 (*App. 1.*) Spinning.
 Codd, H., 75, Bottles; 221, Tramways.
 Coignet, Son and Co., 305, Manure.
 Cole, F., 110, Air-engines.

Conder, E., 32, Mechanical motive-power.
 Cookerly, M., 459 (*App. 33.*) Hoes.
 Cooper, J., 16, Casting metals.
 Corliss, S. G., 300, Clothes wringers.
 Coubro, T. P., 185, Ships' sails.
 Coulter, J., 159, Governors.
 Cowles, E., 99, Cooling candle moulds.
 Cowper, E. A., 131, Sewing boots and shoes.
 Cox, J., 214, Extracting and recovering oils, fats, &c.
 Cox, S., 214, Extracting and recovering oils, fats, &c.
 Cox, S. F., 273, Leather.
 Coxeter, J., 302, Administering nitrous oxide gas.
 Craven, T. C., 22, Ginning cotton.
 Crispin, W. H., 122, Furnaces.
 Croll, A. A., 45, Distilling liquors, &c.
 Cumming, J., 267, Feeding paper to printing and
 other machines.
 Curtis, F., 769 (*App. 36.*) Paper-making; 1924
 (*App. 48.*) Steam-boilers and engines; 2238
 (*App. 52.*) Sewing boots and shoes; 2389 (*App.*
 2.) Cutting precious stones.
 Cutter, J. M., 1646 (*App. 45.*) Valves.

D.

Davies, R. V., 210, Water waste preventers.
 Davis, C., 353, Preventing ships foundering; 354,
 Saving life and property at sea.
 Davis, G., 162, Ships' davits.
 Davis, J., 2353 (*App. 2.*) Tanning.
 De Boucherville, G. B., 2583 (*App. 5.*) Propelling
 ships.
 De Chodzko, N. F. B., 124, Steam-boilers.
 De Kercado, G. T., 104, Water meters.
 De Labarre, E., 321, Combinations of textile threads.
 De Rutenberg, Baron V., 360, Explosive compounds.
 De Ware, A. A., 304, Umbrella and parasol frames.
 Deacon, H., 505 (*App. 4.*) Chlorine.
 Dean, G. W., 355, Sifting shovels.
 Dean, S., 259, Dressing mill-stones.
 Decastro, D., 12, Wet gas meters.
 Defeher, A. A., 311, Shaping and ornamenting
 butter and pastry.
 Delessert, H. E., 157, Carriages.
 Demailly, G., 1644 (*App. 45.*) Hydro-caloric mo-
 tors.
 Den Bergh, J. Van, 8, Harness.
 Denby, W. S., 192, Gully traps; 312, Steam-boilers.
 Dennis, W., 301, Fire extinguishers, &c.
 Derégnaucourt, A., 103, Boots and shoes.
 Dick, W. B., 362, Extinguishing fires.
 Dietz, R. E., 319, Self-setting animal traps.
 Digney, J. D., 247, Signals.
 Digney, T. S., 247, Signals.
 Dixon, J., 222, Bridges and viaducts.
 Dodge, T. A., 1901 (*App. 48.*) Hydraulic hose.
 Donath, F. A. H., 407 (*App. 5.*) Cigars.
 Donisthorpe, R. F., 108, Crimping hair.
 Donoghue, J. D. O., 2420 (*App. 3.*) Tooth brushes.
 Donoghue, W. O., 2420 (*App. 3.*) Tooth brushes.
 Dougall, J. Mc, 393, Manure.
 Dougherty, W., 932 (*App. 37.*) Casting metals.
 Doury, P., 89, —Waterwheels.
 Drummond, D., 6, Casting metals.
 Du Bois, C., 1250 (*App. 40.*) Elevating apparatus.
 Du Motay, C. M. T., 328, Baryta.

euil, V. 410 (*App. 5.*) Lubricating.
met, J., 2377 (*App. 2.*) Nets.
ee, E., 1575 (*App. 44.*) Gas.
e, H., 366, Axles and axle boxes.
can, G., 383, Printing.
sch, G. J., 33, Water gauges.

E.

a, R., 26, Grinding corn.
s, W. P., 2354 (*App. 2.*) Rotary engines.
ome, T. L. B., 1645 (*App. 4.*) Fetting furnaces.
ards, G. W. B., 243, Manure drills.
ards, J. C., 373, Preparing and cleaning cotton,
meyer, R., 76, Hats.
W. T., 369, Cartridge cases.
lie, E. W., 211, Opening cases, boxes and cans.
ley, R., 251, Railway signals.
ens, S. H., 2108 (*App. 51.*) Signals.
ne, F., 192, Gully traps; 312, Steam-boilers.
s, W. N., 14, Tanning.
s, W. R., 2261 (*App. 1.*) Fire-arms.

F.

airn, R., 260, Washing fibres.
airn, Sir W., 270, Steam-boilers.
lough, H., 350, Separating flour from mid-
ngs, &c.
lough, J., 350, Separating flour from mid-
ngs, &c.
w, C., 218, Bottle stoppers.
ett, T., 159, Governors.
W. C., 1101 (*App. 39.*) Fibres.
er, S., 265, Fire-places.
elly, R., 245, Aërial tramways.
, A. G., 56, Signals.
C. M., 2389 (*App. 2.*) Cutting precious stones.
r, R. A., 2435 (*App. 3.*) Preserving iron and
el.
F., 1584 (*App. 44.*) Printing telegraphs.
J. E., 19, Dies.
t, H., 247, Signals.
et, H. E., 610 (*App. 34.*) Turning axles.
r, B. H., 252, Steam and other engines.
r, W., 384, Spinning.
s, W., 59, Charging and drawing retorts.
r, H., 77, Hospital beds.
H. B., 390, Waterproof garments.
an, H. O., 980 (*App. 38.*) Cheese.
J., 381, Presses.
r, T., 161, Billiard cues.

G.

C., 392, Furnaces.
ner, P. G., 37, Springs.
t, F., 62, Stoves.
r, R. F., 145, Treating hides, cotton waste and
ls.

Gay, P., 95, Excavating minerals.
Gedge, W. E., 104, Water meters; 202, Cocks and
vent pegs; 295, clocks; 375, Blocking boots;
403 (*App. 5.*) Converting a slow alternate circular
motion into a rapid continuous circular motion.
Gense, C., 130, Mattresses.
George, C., 224, Barometers.
Gibbs, G., 284, Fire-arms.
Gibbs, H. H., 330, Driving straps and bands.
Gibson, G., 289, Governors.
Gibson, R. H., 119, Desks and seats.
Gilbee, W. A., 564 (*App. 34.*) Nets.
Gillespie, J., 1062 (*App. 38.*) Bungs and bung in-
serters.
Girdwood, R., 314, Gas burners.
Glen, G., 176, Railway and tramway rolling stock.
Goddu, L., 1313 (*App. 41.*) Monitors.
Goodrich, G. W., 90, Puddling furnaces.
Goodrich, L. S., 90, Puddling furnaces.
Gordon, J., 10, Envelopes.
Goueslain, A., 202, Cocks and vent pegs.
Gould, S. L., 769 (*App. 36.*) Paper-making.
Graham, J. C., 13, Cart saddles.
Gray, R. B., 1233 (*App. 40.*) Granulators.
Grey, E., 276, Microscopes.
Grieve, T. W., 294, Theatre stages.
Griffith, J., 2170 (*App. 52.*) Steam-boilers.
Grigg, W., 786 (*App. 36.*) Applying electricity to
cattle.
Gindrod, J. T., 391, Raising and floating vessels, &c.
Griswold, L., 2176 (*App. 52.*) Sewing-machines.
Guernsey, J. W., 1352 (*App. 42.*) Shearing animals.
Guerrero, A., Comte de St. Ange, 2184 (*App. 52.*)
Horse-shoes.
Gumpel, C. G., 9, Lowering ships' boats.
Gutensohn, A., 258, Obtaining salt of tin and pro-
ducts from waste or refuse tin plate.

H.

Haas, B., jun., 2231 (*App. 52.*) Dial indicators for
carriages.
Hadfield, R., 1787 (*App. 46.*) Wheels, axles, shafts.
Haggett, W., 1461 (*App. 43.*) Metals.
Haight, H. J., 966 (*App. 38.*) Artists' scrapers.
Hale, E., 264, Rolling metals.
Haley, S., 323, Treating hides and skins.
Haley, S. H., 323, Treating hides and skins.
Halfpenny, G. W., 262, Ink, incombustible paper,
envelopes and books.
Hall, J. H., 26, Grinding corn.
Hamilton, E. C., 187, Manure.
Hamilton, J. B., 387, Organ reed pipes.
Hampton, T., 842 (*App. 37.*) Armour plates.
Hannart, L., 397, Ticketing shop goods, &c.
Harding, G. E., 2064 (*App. 50.*) Furnaces.
Harmer, T., 335, Cleaning glass roofs.
Harrison, B., 32, Mechanical motive-power.
Harrison, C., 121, Umbrellas, parasols and sun-
shades.
Harrison, C. W., 1, Air-gas.
Hart, G. W., 315, Steam-boilers.
Hartley, R., 81, Singeing yarn.
Harwood, I. K., 967 (*App. 38.*) Pumps.

- Haseltine, G., 13, cart saddles; 77, Hospital beds; 126, Projectiles; 128, Rolling metals; 213, White lead; 233, Washers; 259, Dressing mill-stones; 303, Hinges; 326, Converting cast iron into steel; 351 Torpedo launches; 459 (*App.* 33.) Hoes; 681 (*App.* 35.) Economizing fuel; 806 (*App.* 36.) Lamps; 932 (*App.* 37.) Casting metals; 967 (*App.* 38.) Pumps; 1250 (*App.* 40.) Elevating apparatus; 1352 (*App.* 42.) Shearing animals; 1517 (*App.* 44.) Railway carriage-couplings; 1622 (*App.* 45.) Paper bags; 1641 (*App.* 45.) Separating liquids and substances; 2064 (*App.* 50.) Furnaces; 2212 (*App.* 52.) Sewing-machines; 2255 (*App.* 1.) Valves; 2257 (*App.* 1.) Inhaling apparatus; 2270 (*App.* 1.) Railway watering columns; 2284 (*App.* 1.) Weaving; 2287 (*App.* 1.) Reaping and mowing; 2311 (*App.* 1.) Distilling turpentine; 2353 (*App.* 2.) Tanning; 2354 (*App.* 2.) Rotary engines; 2600 (*App.* 5.) Preparing and packing water colors.
- Hatfull, R., 281, Preventing and removing incrustation in steam-boilers.
- Hawkins, J. G., 220, Gas.
- Haycock, S. H., 126, Projectiles.
- Hayek, —, 310, Artificial stone.
- Heaton, R. G., 388, Fishing reels.
- Hemingway, J., 297, Railway keys and wedges.
- Henderson, A. C., 1644 (*App.* 45.) Hydro-caloric motors; 1645 (*App.* 4.) Fettling furnaces.
- Henley, T. F., 212, Meat extract.
- Henley, W. T., 254, Puddling furnaces.
- Henry, M., 33, Water gauges.
- Henson, H. H., 191, Shaping and punching iron.
- Herrick, S. K., 2185 (*App.* 52.) Sewing-machines.
- Hersey, C. H., 1233 (*App.* 40.) Granulators.
- Hersey, F. C., 1233 (*App.* 40.) Granulators.
- Hewett, S. B., 1793 (*App.* 46.) Fire-places.
- Heyworth, E., 1890 (*App.* 48.) Steam-boilers.
- Hidden, T. B., 2600 (*App.* 5.) Preparing and packing water colors.
- Highton, H., 85, Electric telegraphs.
- Hillmann, J. H., 90, Puddling furnaces.
- Hindley, G., 178, Dressing stone.
- Hinds, E. C., 282, Preventing accidents on railway platforms.
- Hipkins, E., 165, Iron safes.
- Hitchcock, R., 356, Lamps.
- Hodges, S. H., 1380 (*App.* 42.) Boots and shoes.
- Hodson, H. F., 93, Agricultural and horticultural implements.
- Hollingworth, J., 1464 (*App.* 43.) Weaving.
- Holman, S., 115, Gas retort mouthpieces, lids and fasteners; 136, Raising and lowering gas purifier lids, &c.
- Holmes, J. E., 98, Centrifugal machines and kilns.
- Hookham, G., 240, Metallic box fastenings.
- Hookham, H. J., jun., 240, Metallic box fastenings.
- Hopkinson, J. T., 181, window fasteners.
- Horner, G., 188, Spinning.
- Horsley, T., jun., 204, Closing cartridge cases.
- Hosking, J., 343, Safety valves.
- Howard, E. I., 2255 (*App.* 1.) Valves.
- Howe, W. H. I., 1428 (*App.* 4.) Fruit preserving cans, &c.
- Howlett, E. J., 1622 (*App.* 45.) Paper bags.
- Huch, E. H., 288, Soup farina.
- Hugall, C. E., 177, Window fasteners.
- Hughes, E. T., 63, Towing canal boats; 321, Combinations of textile threads.
- Hughes, P., 96, Dishes and plates.
- Hunt, B., 40, Printing telegraphs.
- Hunt, S., 142, Building blocks.
- Hunter, C. D., 2257 (*App.* 1.) Inhaling apparatus.
- Huntington, F. A., 1753 (*App.* 46.) Steam boilers and furnaces.
- Hutchings, A. J. H., 588 (*App.* 3.) Pickling.
- Hutchinson, J., 1464 (*App.* 43.) Weaving.
- Huxtable, J., 363, Turn-wrest ploughs.

I.

- Ibbetson, J., 378, Leather.
- Imray, J., 309 Steam-boilers; 325, Heating, evaporating, distilling, &c.
- Ireland, W., 263, Wheel tyres.

J.

- Jackson, W., 338, Heating feed water.
- Jacobsen, F., 266, Manure.
- Janney, E. H., 1517 (*App.* 44.) Railway carriage-couplings.
- Jarman, H., 164, Steering ships.
- Jasper, C. E. F., 407 (*App.* 5.) Cigars.
- Jaynor, A., 66, Steering and hoisting.
- Jelley, R. S. C., 271, Cutting tenons.
- Jensen, P., 149, Printing telegraphs.
- Jewitt, H., 55, Toys.
- John, W. H. St., 2527 (*App.* 4.) Purifying gas.
- Johnson, A. F., 371, Fire alarm and water supply apparatus.
- Johnson, J. H., 18, Spinning; 43, Transmitting power; 155, Fire-arms; 247, Signals; 305, Manure; 319, Self-setting animal traps; 356, Lamps; 405 (*App.* 5.) Liquid fuel; 406 (*App.* 5.) Tin foil; 1234 (*App.* 40.) Steam-engines; 1947 (*App.* 48.) Speed indicators; 2061 (*App.* 50.) Casting metals.
- Johnson, J. O., 2342 (*App.* 2.) Fluid meters.
- Jones, D., 372, Forcing inflammable fluid and liquid into furnaces.
- Jones, E., 386, Cartridges.
- Jones, F. L., 298, Weaving.
- Jones, H., 187, Manure.
- Jones, J. S., 283, Basting meat.
- Jones, R. C., 271, Cutting tenons.
- Jones, S. B., 261, Railway carriages and platforms.
- Jones, W., 118, Valves.
- Joslin, W., 341, Furnaces.

K.

- Kalmar, A., 5, Compasses.
- Kay, T. B., 379, Carding engines.
- Kercado, G. T. de, 104, Water meters.
- Kesterton, H., 53, Rolling metals; 54, Metal telegraph posts; 253 Steam-boilers.
- King, J. A., 116, Peat-fuel.

h, J., 102, Bakers' ovens.
 I., 200, Governors.
 806 (*App.* 36.) Lamps.
 234, Umbrellas, parasols and sunshades.
 M., 105, Weaving.
 116 Ventilating closets, &c.
 N., 91, Electrical heat.
 80, Air-gas.
 584 (*App.* 44.) Printing telegraphs.

L.

Van, 1062 (*App.* 38.) Bungs and bung
 . de, 321, Combinations of textile threads.
 S., 186, Lowering ships' boats.
 R., 26, Grinding corn; 27, Cleaning
 79, Thread spools; 80, Air-gas; 127,
 ts, elbows or couplings; 225, Fireproof
 226, Fireproof safes; 227, Boots and
 279, Railway breaks; 290, Refrigerat-
 300, Clothes wringers; 317, Break-
 371, Fire alarm and water supply ap-
 396, Treating middlings; 558 (*App.*
 ling and boring; 1737 (*App.* 46.) Veneers;
 pp. 1.) Traction-engines.
 340, Spinning.
 W., 73, Knitting machines.
 P., 130, Mattresses.
 F. W., 2481 (*App.* 4.) Tuyeres.
 H., 247, Signals.
 172, Printing.
 331, Manure.
 L., 368, Artificial stone.
 1, Carding-engines.
 1, Carding-engines.
 1, 1078 (*App.* 39.) Sewing-machines.
 357, Preparing and carding wool; 358,
 ing; 359, Preparing wool.
 W., 30, Valves.
 287 (*App.* 1.) Reaping and mowing.
 H., 594 (*App.* 34.) Steam-boilers and
 , 190, Metal telegraph posts.
 , 2567 (*App.* 5.) Preserving wood from the
 of insects.
 T., 46, Bronzing and coloring paper, &c.
 S., 15, Aërial tramways.
 F., 2057 (*App.* 50.) Hydraulic hoists.
 322, Boots and shoes.
 2311 (*App.* 1.) Distilling turpentine.
 G., 2061 (*App.* 50.) Casting metals.
 A. N., 91, Electrical heat.
 T., 298, Weaving.
 ers, F. Van, 63, Towing canal boats.
 M., 217, Hydraulic motive-power.
 36, Steam-boilers.
 73, Knitting machines.
 G., 46, Bronzing and coloring paper, &c.
 380, Moulding bricks.
 A., 52, Roofs, floors and pavements;
 ilway chairs.

M.

McCarty, B. F., 681 (*App.* 35.) Economizing fuel.
 McClean, F., 41, Raising ships.
 McClure, W. B., 13, Cart-saddles.
 McDougall, J., 393, Manure.
 McWilliams, A. S., 2005 (*App.* 49.) Sheep shears.
 Macaulay, H., 92, Fire-arms.
 Macneill, Sir J., 206, Tramways and carriages.
 Macneill, R., 184, Pavements.
 Maitre, E., 2010 (*App.* 49.) Covering surfaces with
 wood.
 Malpas, W., 2567 (*App.* 5.) Preserving wood from
 the ravages of insects.
 Mamelzer, T., 397, Ticketing shop goods, &c.
 Manbré, A., 2, Valves.
 Marchand, I. F. B., 375, Blocking boots.
 Markham, R. J., 345, Wheels.
 Marquez, P., 317, Breakwaters.
 Martin, B. G., 486 (*App.* 33.) Presses; 1148
 (*App.* 39.) Presses.
 Martin, C., 174, Spinning.
 Martin, S. B., 290, Refrigerating.
 Marval, H. C., 398 (*App.* 3.) Fire-arms; 413
 (*App.* 3.) Fire-arms.
 Mason, F. H., 681 (*App.* 35.) Economizing fuel.
 Masourine, M. S., 207, Caissons.
 Masson, J. B. F., 406 (*App.* 5.) Tin foil.
 Matthews, C., 264, Rolling metals.
 Matthews, W. J., 138, Fire-arms.
 Mayers, H., 2057 (*App.* 50.) Hydraulic hoists.
 Meakin, G. F. L., 1179 (*App.* 49.) Hanging sashes
 and shutters.
 Mellor, W. W., 132, Cutting glass.
 Mewburn, J. C., 410 (*App.* 5.) Lubricating.
 Meylert, A. P., 213, White lead.
 Michaud, P. F., 629 (*App.* 34.) Axle-boxes.
 Michelet, J. C., 403 (*App.* 5.) Converting a slow
 alternate circular motion into a rapid continuous
 motion.
 Mickle, W., 803 (*App.* 36.) Smelting and puddling
 iron; 921 (*App.* 37.) Economizing fuel; 1656
 (*App.* 45.) Economizing fuel.
 Middlehurst, James, 346, Potato and other root
 gatherers, &c.
 Middlehurst, John, 346, Potato and other root
 gatherers, &c.
 Middlemass, J., 306, Clerical costumes.
 Milburn, J., 483 (*App.* 4.) Chimney cowls.
 Miller, S. H., 19, Dies.
 Mills, B. J. B., 431 (*App.* 5.) Screw propellers.
 Mills, F., 379, Carding engines.
 Mills, J. H., 1924 (*App.* 48.) Steam-boilers and
 engines.
 Mills, J., L., 123, Printing.
 Milner, E., 196, Lubricating.
 Molyneux, E. L., 2600 (*App.* 5.) Preparing and
 packing water colors.
 Monkhouse, T. S., 123, Printing.
 Moody, C., 2023 (*App.* 49.) Locks.
 Morgan-Brown, W., 822 (*App.* 36.) Boots and
 shoes; 1233 (*App.* 40.) Granulators; 1901 (*App.*
 48.) Hydraulic hose.
 Morris, E. R., 29, Chartometers.
 Morris, T. S., 394, Furniture casters.
 Motay, C. M. T. du, 328, Baryta.

Muirhead, L. P., 244, Speed indicators.
 Murdoch, H. H., 360, Explosive compounds.
 Myers, A. G., 127, Pipe-joints, elbows or couplings.

N.

Napier, J., 246, Excavating under water.
 Naylor, M., 167, Weaving.
 Needham, J., 31, Fire-arms and cartridges.
 Negley, J. S., 431 (*App. 5.*) Screw propellers.
 Neil, W., 2067 (*App. 50.*) Distilling spirituous liquors.
 Neill, J., 377, Forming sugar into blocks.
 Newcomb, W., 967 (*App. 38.*) Pumps.
 Newell, L. D., 503 (*App. 3.*) Ships' berths and sofas.
 Newton, A. V., 20, Paper-ruling machines; 257 Steam vacuum pumps.
 Newton, W. E., 19, Dies; 28, Musical instruments; 89, Waterwheels; 90, Puddling furnaces; 256, Fire-arms; 340, Spinning.
 Nichols, F. W., 303, Hinges.
 Nichols, J., 215, Ventilating waterclosets, &c.
 Norman, J., 135, Clipping animals.

O.

O'Donoghue, J. D., 2420 (*App. 3.*) Tooth brushes.
 O'Donoghue, W., 2420 (*App. 3.*) Tooth brushes.
 Oldknow, J., 24, Lace-making.
 Olds, P. F., 681 (*App. 35.*) Economizing fuel.
 Olley, G., 338, Heating feed water.
 Olsen, C. H. G., 149, Printing telegraphs.
 Onderdonk, J. P., 1622 (*App. 45.*) Paper bags.
 Osborn, S., 313, Forging metals.
 Osborne, D. T., 198, Self feeding air-tight stoves.
 Osborne, J. W., 1947 (*App. 48.*) Speed indicators.
 Owen, J., 160, Mine shafts and hoists.

P.

Paddison, H., 193, Breakwaters, docks, piers, &c.
 Page, R. W., 107, Cutting screws.
 Paget, F. A., 5, Compasses.
 Pagliara, G., 405 (*App. 5.*) Liquid fuel.
 Palmer, R., 198, Self feeding air-tight stoves.
 Parker-Rhodes, C. E., 173, Illuminating clocks, names, signs, &c.
 Parkyn, J., 396, Treating middlings.
 Parlour, J. T., 25, Cabs and other vehicles; 144, Wheels for carriages.
 Pasquier, A., 295, Clocks.
 Paterson, J., jun., 365, Steam traps.
 Patison, J., 569 (*App. 5.*) Gas, fuel, oil, &c.
 Patterson, R. H., 274, Purifying coal gas.
 Peacock, G., 364, Chain cables.
 Pearl, O., 18, Spinning.
 Pearson, W., 121, Umbrellas, parasols and sunshades.
 Peebles, D. B., 7, Gas regulators.
 Pelouze, E. P., 109, Condensing liquefiable matters.
 Pengilly, C., 563 (*App. 34.*) Filters.

Perkins, C. H., 128, Rolling metals.
 Perman, C. H., 194, Metallic boxes.
 Petersen, C., 1394 (*App. 42.*) Ships' logs.
 Pettifer, C., 395, Ventilating mines, buildings, drains, ships, &c.
 Philippi, F., 11, Smelling bottles.
 Picq, H., 43, Transmitting power.
 Pink, R., 263, Wheel tyres.
 Pitcher, W., 146, Craping hair, &c.
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4. Index of Subject-matter to Chronological and Descriptive Index from January 1 to February 1, 1873, and to Appendixes from February 2 to August 2, 1873.

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CHRONOLOGICAL AND DESCRIPTIVE INDEX
OF PATENTS APPLIED FOR AND PATENTS GRANTED,

CONTAINING THE

ABRIDGMENTS OF PROVISIONAL AND COMPLETE SPECIFICATIONS

Delivered from February 2 to February 8, 1873.

A.D. 1873, February 3.—No. 398.

MARVAL, HENRY CHARLES, of Birmingham, in the county of Warwick.—(*A communication from General Hiram Berdan, of the city of New York, in the United States of America.*)—"Improvements in rifling barrels for breech loading firearms."

I make the rifling of the barrel to consist of a suitable number of broad shallow grooves separated from each other by very narrow lands. In a transverse section the bottoms of the grooves are neither flat nor concentric with the axis of the bore, but each is curved to a radius equal or nearly equal to the whole diameter of the interior of the barrel measured from the bottom of one groove to the bottom of the opposite groove, and at the centre of the width of each groove.

From this method of forming the grooves it will be obvious that the internal diameter of the barrel measured at the corners of the grooves will be larger than the internal diameter measured at the centre of the width of the grooves; but the diameter across the corners will not be relatively so great as it would be if flat bottomed grooves were used.

Further, I make the lands to project towards the axis of the bore beyond the line of the bottoms of the grooves; that is to say, the smallest diameter of the bore at any given section is that which is measured across from the interior face of one land to that of the opposite land.

A.D. 1873, February 3.—No. 399.

BOWDEN, JAMES, of Saint Mary's Road, Canonbury, in the county of Middlesex, accountant.—"Improvements in apparatus used in the manufacture of salt."

The features of novelty of this invention consist, First, in arranging the heat flues of salt pans in a zig zag winding or circuitous direction, instead of the said flues passing direct from the fires to the chimney as heretofore generally practised, and by these means to utilize the heat that is now lost, and thereby economize the consumption of fuel. Second, in surrounding salt pans with some substance or material which is a non conductor of heat to prevent loss of heat by radiation, also in adapting a cover to the pan to protect it from rain or cold air. Thirdly, the formation of a brine tank immediately above the salt pan through which the flues in a series of tubes or passages shall pass; the said tubes or passages coming immediately in contact with the brine in the tank will impart to it its heat, and thus increase the temperature of the brine.

A.D. 1873, February 3.—No. 400.

WEBER, JEAN HENRY, of Charenton, near Paris, and ROY, JEAN, of No. 148, Rue de la Procession, Paris, in the Republic of France, gentlemen.—"Improvements in the manufacture of umbrellas and parasols."

Hollow ribs are employed of the form of a horse shoe in section and formed in two or three parts united by hinge joints. The parts are kept rigid when the umbrella is opened by means of a rod moved by the ordinary stretcher. The handle or stick is made in several parts moving upon one another telescope wise.

A.D. 1873, February 3.—No. 401.

CATON, JEAN BAPTISTE, of No. 10, Rue de la Fidélité, Paris, in the Republic of France, gentleman.—"An improved apparatus for the use of smokers."

This apparatus consists of a box provided with a prepared wick and a steel disc turned by a spring or gearing and made to strike when required against a piece of hard stone, by which sparks are produced and light the end of the wick.

[No. 6.] Price 4d.

A.D. 1873, February 3.—No. 402.

THORNELOE, JAMES, of Birmingham, in the county of Warwick, joiner.—“Improvements in organs and “harmoniums.”

According to this invention, the rows of keys are arranged nearly in the same plane, so that the performer can perform with one hand partly on one row of keys and partly on another.

Arrangements are described for coupling either row of keys to the one row or all the rows of keys below it—also for coupling a row of keys with the row next above it—also for coupling the upper of three or more rows to the lower row—or the reverse—also for coupling the keys of any row with the octave higher or lower of the same row or of a different row. The pallets are opened by the agency of electricity. They are also constructed with a parallel motion instead of a hinge joint and are lifted from their seats by a knee or toggle joint. They are also made compound to diminish the resistance to their opening. The sound board is so constructed that the pipes, upper board, slider, and portion of table appertaining to any stop may be removed without disturbing the remainder. The swell is constructed of two sets of shutters mounted on opposite ends of a beam, so that the shutters are balanced in every position. The whole of the parts of any one series (except the pipes) are made of one uniform size, so as to make them replaceable and capable of being made to a great extent by machinery.

A.D. 1873, February 3.—No. 403.

GEDGE, WILLIAM EDWARD, of No. 11, Wellington Street, Strand, in the county of Middlesex, patent agent.—(*A communication from Jean Constant Michelet, of Dieppe (Seine Inférieure), France.*)—“A new “system for converting a slow alternate circular motion into a rapid continuous circular motion.”

This invention is a practical solution of a problem of transformation of motion, a solution independent of the nature of the motor as well as of its applications, but is here described in its application to a blower or blast fan and field-forging.

A lever being fixed on a lower shaft and an arc or segment of a circle being set on the same shaft, each movement of the lever to the right or to the left will cause a corresponding movement of the segment of a circle.

Upon this segment of a circle are fixed two belts or straps winding on the upper shaft, to which they give an alternate circular motion.

Upon the upper shaft is keyed a very light wheel which will make two revolutions and a half for each simple movement of the lever.

Upon the wheel is fixed the end of a cord winding two and a half times round it, enveloping a cylinder, passing over guide rollers, enveloping a second cylinder, and coming back upon the light wheel, its end being secured to a stretcher.

The relation of the radii between cylinder and light wheel is such that the cylinder makes from 20 to 25 revolutions for each simple movement of the lever.

The circular motion is rendered continuous as follows:—

The cylinders are moved with an alternate circular motion. The shaft of the blower must follow the continuous circular motion, for which purpose the cylinders are loose on this blower shaft, the momentary gearing or clutching with which is effected by means of two catches; when the movement of one of the cylinders takes place in the direction of the continuous rotation of the blower shaft, the catch corresponding with this cylinder penetrates into openings presented by the inner face of this cylinder, at the same time that the catch at the opposite end is driven out of similar openings in the other cylinder, and the continuity of the circular movement is thus obtained without appreciable effort.

A.D. 1873, February 3.—No. 404.

ANDREWS, JOHN CLARK, of Crewkerne, in the county of Somerset, manager.—“Improved apparatus for “heating water or other liquids by the direct action of steam.”

The object of this invention is, first, to economize fuel and utilize the heat of the steam; second, to cause a proper and continuous circulation of the water or other liquid that is to be heated; and third, to prevent the noise and rattle that usually takes place when steam is injected under pressure into a liquid.

A.D. 1873, February 3.—No. 405.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Giovanni Pagliari of Paris, in the Republic of France, chemist.*)—“Improvements in the “treatment of essential oils, with a view to their employment as fuel for heating purposes.”

This invention consists in solidifying essential oils, and more especially petroleum, with a view to their application as fuel to heating purposes by bringing such oils in contact with solid porous bodies having the property of absorbing essential oils, such, for example, as wood, sawdust, pumice stone, and more particularly coke.

It is further proposed to combine essential oils (especially petroleum) with other inflammable substances which may also be used as fuel, for example, with oils of the same inflammable nature, in a solid or concrete form, white resin, colaphany, and such like substances, and to obtain a homogenous mixture with petroleum oil for the purposes of heating.

A.D. 1873, February 3.—No. 406.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Jean Baptiste Ferdinand Masson, of Paris, in the Republic of France.*)—"Improvements in the manufacture of tin foil, and in the covering of other metals with tin, also in the machinery or apparatus employed therein."

This invention relates to a peculiar process of and apparatus for manufacturing at one and the same time and in one apparatus two sheets of tin foil of any desired thickness, or of coating, if desired, a plate or sheet of lead or other metal with tin by allowing the molten tin to adhere to the sides of a prepared surface which is drawn up vertically through the bath of tin, being divided for that purpose. If a sheet of scoured metal be so drawn up, the tin will adhere permanently thereto and thus coat it.

A.D. 1873, February 3.—No. 407.

DONATH, FERDINAND AUGUST HERMANN, and JASPER, CARL ERDMANN FRIEDRICH, both of Dresden, Saxony.—"Improvements in the manufacture of cigars, and in machinery and apparatus therefor."

The first part of our invention relates to a filler making machine. The tobacco from which the fillers are to be made is placed in a trough and thence conveyed into a channel in which it is fed towards a cutter. The cut off tobacco first drops on two movable-hinged-gates, it is then conveyed into a strap and a movable rolling board. Before the rolling operation commences the attendant must have placed the binder on the strap. The second part of our invention relate to a method of moulding the points of the cigar fillers; and apparatus to be applied for this purpose. One end of the filler is introduced into a recess between two dies. The dies are closed and the filler end compressed.

A.D. 1873, February 3.—No. 408.

COOK, WALTER, of No. 9, Dock Street, Upper East Smithfield, in the county of Middlesex, wheel manufacturer.—"Improvements in suspended and other wheels and in elastic tires for the same."

This relates to means for keeping the tire stiff with the nave.

A.D. 1873, February 4.—No. 409.

MEWBURN, JOHN CLAYTON, of 109, Fleet Street, in the city of London, patent agent and consulting engineer.—(*A communication from Jean Baptiste Deplechin and Pierre Lucien Mathelin, both of Lille, France.*)—"An improvement in cocks for water meters and other like purposes."

This Provisional Specification describes the making of the rubbing or frictional parts of the plugs of cocks, viz., those parts which bear upon the seat, horizontal instead of conical or tapered, so as to prevent sticking or jamming.

A.D. 1873, February 4.—No. 410.

MEWBURN, JOHN CLAYTON, of 169, Fleet Street, in the city of London, patent agent and consulting engineer.—(*A communication from Victor Dubreuil, of Roubaix, France.*)—"Improvements in the means or apparatus for lubricating vertical spindles or shafts in spinning or other machines."

This Provisional Specification describes the making of the collars or bearings of spindles and vertical shafts with a screw thread instead of smooth as heretofore. The rotation tends to make the oil rise up the spirals, so that the lubrication is, as it were, constant, whereas when the collars or bearings are smooth, the oil soon descends to the bottom.

A.D. 1873, February 4.—No. 411.

DERHAM, THOMAS SHANN, of Leeds, in the county of York.—(*A communication from Augustus Morand, of Brooklyn, New York, United States of America, gentleman.*)—"Improvements in kilns for drying and burning bricks, tiles, pottery, and other articles or materials."

The said invention relates to kilns consisting of a series of chambers or compartments with flues or passages controlled by dampers. I provide each of the said chambers with a permanent separate or independent chimney. I also provide a hot air and steam collecting space in or near the rear end of each of the chambers. In a kiln thus constructed I provide longitudinal flues extending from end to end of the series of chambers both at the top and bottom of the same.

A.D. 1873, February 4.—No. 412.

SIMON, HENRY, of Manchester, in the county of Lancaster, civil engineer.—(*A communication from Friedrich Ludwig August Büttner, civil engineer, of Aachen.*)—"Improvements in tubular boilers and heating tubes."

The main principle or feature of this invention is, fixing tubes on one side only, so as to have them communicating on that side only, and the promotion of the circulation of the water through each tube either by small interior tubes or by inserting inside, sheet iron strips or diaphragms, and dividing the communication chamber by partitions in such a way as to oblige the water to pass through the whole series of tubes and along all the zig zags established in the boiler.

A.D. 1873, February 4.—No. 413.

MARVAL, HENRY CHARLES, of Birmingham, in the county of Warwick.—(*A communication from General Hiram Berdan, of the city of New York, in the United States of America.*)—"Improvements relating to the transformation and manufacture of rifled breech loading firearms."

My invention consists, firstly, substantially in making the lands in the breech tube narrower than the lands in the barrel, so that when the breech tube is inserted in the barrel its lands conceal themselves behind the lands in the barrel, and do not project on either side, even although the lands in the barrel may vary slightly in width, from the barrels having been rifled with cutters of different widths.

I form inclined surfaces in the rear end of the barrel forward of the breech tube, and also in the forward end of the rifled tube, so that the bullet shall gradually enter the rifling in the barrel, and so that the said inclined surfaces may guide the bullet into a central position and obviate the ill effects of any slight discrepancies between the rifling in the tube and that in the barrel.

My invention consists, secondly, in rifling the forward end of the breech tube to a larger diameter than the interior of the barrel to which it is to be applied, so that the said forward end of the breech tube shall fit the outside of a cartridge case, having its forward end also rifled both externally and internally; that is to say, externally to fit the interior of the rifled breech tube as aforesaid, and internally, to fit the exterior of a bullet, which has been rifled so as to exactly fit the barrel before being inserted in the said cartridge case.

A.D. 1873, February 4.—No. 414.

TALCOTT, CALEB MCKINNEY, of Hartford, Connecticut, United States of America, now residing at Manchester, in the county of Lancaster.—(*A communication from Jared Augustus Ayres, of Hartford, Connecticut, United States of America.*)—"Improvements in machinery for manufacturing screws."

In the machinery forming the subject of the present invention, the blank from which the screws are formed is gripped between jaws moved to open and shut automatically, and while so gripped is acted upon by a planing tool or more correctly speaking a slotting tool moving in a right line or nearly so, each cutter in the tool cutting to a different depth, so that each cutter planes off its own shaving, and the slot is finished when the whole tool has traversed over the face of the blank.

A.D. 1873, February 4.—No. 415.

WILKINSON, JOHN, the younger, of St. Helen's Mills, Hunslet, Leeds, in the county of York, and BROOK, JOHN, of 54, Green Mount Street, Beeston Hill, Leeds, aforesaid.—"An improved manufacture of carpeting and other similar fabrics."

This invention relates to a novel manufacture of carpet in which jute or kindred vegetable fibre is used in place of wool to form the face of the carpet.

A.D. 1873, February 4.—No. 416.

HAMBRUCH, GUSTAV, of Ebling, Prussia, but at present residing at Morley's Hotel, Charing Cross, in the city of Westminster, engineer.—“Improvements in the construction of railway carriages.”

The body of the carriage is secured against sudden displacement (oscillations) both in a longitudinal and transverse direction by being suspended in a framing of peculiar construction.

A.D. 1873, February 4.—No. 417.

HADWEN, JOHN WILSON, of Bradford, in the county of York, yarn merchant.—“Improved means or apparatus to be employed for mordanting, dyeing, or printing wool, cotton, silk, or other fibres or yarn or fabrics manufactured therefrom.”

The object of this invention is to apply no more than the requisite quantity of colour to the precise part, point, or portion of the fibre, slubbing, roving, yarn, or fabric under operation, and this I effect by the use of grooved, fluted, or pattern cut rollers, the projecting portions alone of which rollers will deposit the colour, whilst the superfluity will be received within the hollows or recessed parts of such rollers.

A.D. 1873, February 4.—No. 418.

CHAMBERS, RICHARD, of Bow, in the county of Middlesex.—“Improvements in machinery or apparatus for cleaning wheat and other grain.”

This invention has for object the passing of wheat or other grain between a rotary and a stationary disc, upon the adjacent surfaces of which wedged shaped knives are set in such manner that the knives on the upper plate, when the plate is made to rotate, will correspond with the interstices between the knives on the lower or stationary one.

The sides of the wedged shaped knives are roughened, and the wheat or other grain which is introduced through a hopper will be cleaned by contact with the roughened surfaces of the knives when the shaft upon which the rotary disc is keyed, is made to revolve.

A.D. 1873, February 5.—No. 419.

HOLDING, JOSEPH, and **HARRIS, WILLIAM RANDALL**, both of Manchester, in the county of Lancaster, machinists.—“Improvements in shuttle-tips.”

The inventors form each shuttle tip with a rounded shoulder situated a short distance from the point.

A.D. 1873, February 5.—No. 420.

DUNN, THOMAS WATHEN, and **PRANGLEY, OSBORNE**, both of Trowbridge, in the county of Wilts.—“Improvements in extracting animal grease and other impurities from wool.”

Wool in its raw state is placed into a chamber into which steam is admitted, and is then pressed.

A.D. 1873, February 5.—No. 421.

BAKER, WILLIAM LEWIS, of No. 8, Danes Inn, in the county of Middlesex.—“Improvements in the mode of supplying fires with fuel, and apparatus therefor.”

This invention relates to means and apparatus for supplying fires with fresh fuel in such manner that the gases evolved therefrom shall pass through the fuel already heated and thereby be more effectually consumed.

The fire receptacle or basket has a barred or grated periphery and is mounted in bearings, so that it can be turned on a horizontal axis and some of its bars can be opened as a door, so that fresh fuel can be introduced and placed upon the already ignited fuel in the basket. The basket is thereupon turned partly round so as to invert the position of its contents and bring the freshly introduced fuel under the ignited fuel, so that the gases in ascending from the fresh fuel through the heated fuel are more effectually consumed.

A.D. 1873, February 5.—No. 422.

KUX, ADOLPH, of Berlin, in the Empire of Germany, engineer.—“Improvements in steam generators.”

According to this invention a cornish boiler is combined with a vertical tubular boiler and a feed water heater, the cornish boiler being connected to the tubular boiler by an aperture or tube at the upper part at

one end establishing a communication between the water and steam spaces of the two parts, while the feed water heater, consisting of a tube extending along the underside of the cornish boiler, establishes a communication between the bottom water spaces of the cornish boiler and the tubular boiler. The flames pass first through the flues of the cornish boiler, thence among the tubes of the tubular boiler, and after passing through return flues surrounding these two parts, they escape to the chimney through a flue surrounding the feed water heater.

A.D. 1873, February 5.—No. 423.

MIRFIELD, MATTHEW, of Montserrat Mills, Holme Lane, near Bradford, in the county of York, worsted top maker, and SCOTT, JOHN, of the same place, manager.—“Improvements in fibre combing machinery.”

This invention relates to machinery, for the purpose above recited, of the class comprising two combs or sets of teeth working in conjunction, as, for instance, the “Noble’s combs,” and has for its object to secure the more efficient action of the tuft detaching comb.

For this purpose we employ dabbing brushes, the bristles of such part of the said brushes as act on the fibre over the tuft detaching comb being made longer, or the ends thereof project further than those of the remaining portion of the said brush, and which act on the fibre over the larger or sliver holding comb. Or in lieu of the brush so formed, separate brushes may be used.

A.D. 1873, February 5.—No. 424.

MCINTYRE, PETER, of the city of Glasgow, in the county of Lanark, North Britain, engineer.—“New or improved machinery or mechanism for sharpening masons’ and engineers’ cutting tools or chisels.”

The nature of this invention consists in inserting the points of the chisel between openings in the periphery of a pair of steel rollers running towards each other and the entering chisel, so that as two eccentric or cam-shaped parts come round simultaneously at the same rolling speed, they roll or squeeze the hot point of the chisel to the flat angle or curve and thinness or sharpness desired, and throw it back out of the roller while yet hot, when it is caught by the attendant and the point put in between the cutting shears of a clipping machine, which cuts off sufficient to square the cutting edge smooth and sharp or serrated regularly with points or teeth for what is known as the “American” rough pointing or sharpening, the working knife of which cutters may be reciprocated and worked from an eccentric on one of the roller shafts or a separate shaft driven by it for the purpose. The steel rollers are mounted in sliding bushes with screws and gearing for setting them to and from each other, in strong side frames fixed on bed plate, all as a portable rolling machine, having the spindles for the rollers geared to each other by spur wheels keyed on them, one of which is driven by a crank handle and fly wheel, or by motive power, as desired.

A.D. 1873, February 5.—No. 425.

HUNT, BRISTOW, of Serle Street, Lincoln’s Inn, in the county of Middlesex, gentleman.—(*A communication from Jean François Colfs-Heyne, of Paris, France.*)—“An improved system of kiln or furnace for the utilization of the waste heat produced by the burning of bricks.”

This invention relates to an improved system of continuous fire furnace or kiln, which the inventor calls the “chessboard system,” for the utilization of the waste heat produced by the burning of bricks, for the burning of plaster, lime, the baking of bread, and the torrefaction of all other kinds of products.

The brick kilns are arranged in a peculiar manner (corresponding somewhat with the alternate black square in a chess board) round a central chimney, and the enclosed furnaces for utilizing the waste heat are formed in the interstices (or white squares) between them. Openings are made in the external walls for charging and discharging the bricks. The enclosed furnaces are charged from above and discharged from the front. The brick kilns only are provided with flues communicating with the chimney, which flues can be at any time closed by means of dampers. These dampers, which are of a bell shape, are raised by a rod passing out through the top of the main smoke flue. In the smaller flues are registers, intended to intercept the continuity of the furnaces. Against the wall in the brick kilns is placed a sheet iron register for intercepting the communication between the brick kilns and the enclosed furnaces. The brick kilns alone are fed with fuel which is introduced through openings made in the roof, such openings being covered with movable lids.

A.D. 1873, February 5.—No. 426.

BROWN, GEORGE, of Holbeck, near Leeds, in the county of York, engineer.—“An improved and “ permanent shoe for horses and other animals.”

The improved shoe is provided with three (or more) steel dies, which are dovetailed into and secured by screws to the shoe, one at the front and the others at the rear, to prevent the horse slipping when drawing or backing. The dies project downwards beyond the surface of the shoe (so that the latter never touches the ground but in case of accident), and give the horse or other animal a better footing and “ purchase ” on the road.

The dovetailed part of each die is broader towards the inside of the shoe than towards the outside, which will have the effect of removing the strain from the screws, one of which fastens each die to the shoe.

A.D. 1873, February 5.—No. 427.

CARRINGTON, WILLIAM THOMAS HENNEY, engineer to the Wire Tramway Company, Limited, 21, Gresham Street, in the city of London.—“Improvements in apparatus for preventing the slipping of “ boxes or carriages used in wire rope transport.”

This consists in the use of blocks formed by fitting into metal or other frames an elastic body or bodies, such as prepared rubber, which is capable of being compressed by the weight, and thus nip or grip the rope sufficiently for the travel of the boxes or carriages up or down inclines of any gradient.

A.D. 1873, February 5.—No. 428.

BARNARD, JOHN PARTRIDGE, of Ebley, near Stroud, in the county of Gloucester.—“Improvements in “ apparatus for preventing the falling of cages, skips, or appliances in the shafts or uptakes of pits, ware- “ houses, and other places.”

This relates to cross timbers or bars working upon a common centre or on separate centres, and with the four legs extending outwards, the lower ones being shaped to engage into teeth or detents in or on the side walls of the shaft or uptake when acted upon by springs.

A.D. 1873, February 5.—No. 429.

SHARP, JAMES PINLEY, of Birmingham, in the county of Warwick, tar distiller.—“Improvements in the “ manufacture of steel, and in casehardening or partially converting iron into steel.”

This invention consists in the employment of any hydrocarbon or other carbonaceous matter alone, or in combination, capable of being applied to heated iron in regular quantities, and whilst the iron is in a closed furnace or retort, the air being carefully excluded, and the carbon applied to the iron in as pure a state as possible.

A.D. 1873, February 5.—No. 430.

TAYLOR, JAMES, gas manager, **BUCKLEY, SAMUEL**, engineer, and **CHADWICK, THOMAS HENRY**, gas collector, all of Oldham, in the county of Lancaster.—“Improvements in machinery or apparatus for “ drawing or charging retorts used in the manufacture of illuminating gas.”

This invention relates to an arrangement whereby the retorts are drawn and a fresh supply of coal or other such material is at the same time supplied.

A.D. 1873, February 5.—No. 431.

MILLS, BENJAMIN JOSEPH BARNARD, of the firm of Harris and Mills, of 35, Southampton Buildings, in the county of Middlesex, patent agent.—(*A communication from James Leander Catheart, of Washington, in the district of Columbia, mechanical engineer, and James Scott Negley, of Pittsburgh, in the state of Pennsylvania, gentleman, both in the United States of America.*)—“Improvements in apparatus connected with screw “ propellers for ships and other vessels.”

The invention consists, Firstly, in so connecting the propeller frame with the rudder that it may be moved simultaneously therewith, but to a less extent.

Secondly. In arranging and adapting the propeller frame to be permanently fixed in any position desired.

Thirdly. In connecting the rudder and propeller frame by adjustable and detachable connections.

Fourthly. In the construction of a universal joint employed to connect the engine shaft and the propeller shaft.

Fifthly. In appliances to facilitate the unshipping and replacing of the propeller.

Sixthly. In a device employed to brace and tie the arm of the propeller crane to the post thereof.

A.D. 1873, February 5.—No. 432.

EARLY, JOSEPH, of 25, New Row, West, in the city of Dublin, commercial traveller.—“Improvements in the mode of enumerating passengers in tramway and other cars.”

This invention consists of a combination of two or more counting discs actuated by a pull motion and connected with a striking gong, all disposed inside a box or case, for enumerating passengers in tramway cars or other public conveyances.

A.D. 1873, February 5.—No. 433.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from George Solomon Levy, of the city, county, and state of New York, United States of America.*)—“Improvements in machinery for applying lining to straw board and other substances.”

This invention consists of a pasting apparatus and carrying and pressing rollers for the thin paper and straw board to be lined; also an endless carrier for the latter, arranged to paste the thin lining paper, lay it on the straw board, and unite it thereto by pressure. Also a steam heated calendering and drying cylinder, and carrying apron in connection therewith, and delivering carriers and rolls, for drying, calendering, and delivering the lined board. Another feature of the invention consists in the construction of the calendering roller of an inside and an outside cylinder, connected together at the ends, steam-tight, so as to form an annular space for the steam used for heating, whereby less heat is lost by radiation, and the roller is made capable of sustaining greater pressure to the square inch, and the load of water of condensation to be carried is diminished.

A.D. 1873, February 5.—No. 434.

CHAPMAN, EDWARD ROBERT, of Clerkenwell, in the county of Middlesex.—“An improved tuck creaser, quilter, or marker.”

The device consists of a slotted plate fixed in a handle, and marked with a gauge. One or more marking wheels are fitted in the slot, so as to be adjustable at any distance apart, which wheels are passed over the fabric for marking or creasing the same in straight or curved lines. The device may also be arranged for marking scollops or patterns.

A.D. 1873, February 5.—No. 435.

HARRISON, CHARLES WEIGHTMAN, of High Holborn, in the county of Middlesex, gentleman.—“Improvements in the treatment and use of air for the manufacture of gas for lighting and heating purposes, and in the apparatus employed therein.”

This Specification describes a method of oxygenising air by passing it under pressure or otherwise through water or any other suitable liquid that will absorb a larger proportion of the oxygen of the air than of the nitrogen. The air thus oxygenised is recovered from the water by a pump or other suitable means and stored for use in a holder, whence it is conveyed by pipes to where required for use, and is then passed through a suitable hydrocarbon and thus converted into inflammable gas or vapour adapted to lighting and heating purposes.

A.D. 1873, February 6.—No. 436.

HEDGES, KILLINGWORTH WILLIAM, of Cannon Row, in the city of Westminster.—“Improvements in combined steam boilers and steam engines.”

The invention consists, firstly, in forming the furnace of fire clay, said furnace being carried by an annular support of cast iron fixed to the bottom or foundation, which is also of cast iron, and to which the boiler is connected. This annular support carries the fire bars and forms the ash pit, and the space between this support and the exterior of the foundation connects the annular smoke chambers.

The invention consists, secondly, in causing the flange of the cylinder to form the foundation for the engine, the cylinder being placed inside the boiler. Thus the flange of the cylinder being planed forms a true bed for the engine to be erected upon, any suitable cement being employed to make a steam tight joint between the flange of the engine and the top of the boiler.

The steam and exhaust pipes are screwed into two holes formed in the flange and communicating with the steam and exhaust passages.

A.D. 1873, February 6.—No. 437.

HAYS, JOSEPH JUDGE, of Hertingfordbury, in the county of Hertford, and HAYS, WILLIAM BENNETT, of Ealing, in the county of Middlesex.—“Improvements in centrifugal hydro-extracting apparatus.”

The object of this invention is to render the action of centrifugal hydro-extracting apparatus continuous. This is effected by mounting within the rotating vessel an inner cylinder or framing carrying a helical scraper driven at a speed somewhat greater or less than that of the rotating vessel.

Matter to be operated on being fed at the one end of the vessel into the annular space between it and the inner cylinder is carried onward by the action of the helical scraper, moving it longitudinally along the porous surface of the vessel, and is finally discharged at the other end.

In this manner moist peat, grains, or spent hops, or like substances, may be subjected in a continuous manner to centrifugal action for the extraction of moisture from them. Also sugar may thus be passed through a centrifugal apparatus for purification, the cleansing liquor being supplied in a continuous stream.

The helical scraper may be a brush, or may be furnished with a brush, for more effectually distributing the matter and clearing the pores of the vessel.

A.D. 1873, February 6.—No. 438.

KNEVETT, ANN, of George Street, Hampstead Road, in the county of Middlesex.—“Improved apparatus to be used in connection with domestic fire-grates.”

In the case of ordinary fire-grates, in which a considerable space exists between the fire-bars and the hearth, a receptacle or box is placed in such space. The receptacle or box is closed at the bottom, and below the fire-bars are placed two plates, one of which is fixed at the hinder edge thereof to the back plate of the receptacle or box, and placed at an inclination towards the front plate of the latter, but not extending thereto. The other plate extends partially across the receptacle or box and over the anterior edge of the hinder plate, and has its forward edge provided with a spindle or gudgeons which works or work in the side plates of the receptacle or box, and is capable of being raised or turned upwards upon the spindle or gudgeons by actuating a knob or lever connected therewith. The hot ashes fall upon the plates which consequently become heated. Such heat is radiated upwards, thus assisting in the combustion of the fuel. When a shallow space only exists between the fire-bars and the hearth, a shallow receptacle is fitted into such space. Above the close bottom of the receptacle are placed flat plates centred at their rear ends to a pivot attached to the back part of the receptacle, their forward ends passing through a slot in the front of the receptacle, so that they can be placed and arranged radially across the receptacle, and of being closed or brought into coincidence with each other.

A.D. 1873, February 6.—No. 439.

BAMBER, RILEY, of Accrington, in the county of Lancaster.—“Improved fire places for economising fuel.”

This invention relates to those fire places in which there are grate bars at the front and bottom as in the ordinary grates, kitchen ranges, and in some descriptions of stoves, and consists in each case in the construction and employment of a perforated metal back capable of having its lower end moved nearer to or farther from the front bars in order to shut off the spaces between the bottom bars, more or less, from the front bars and regulate the capacity of the fire place as required. The back, which is full of holes or made of rods or bars, has at the bottom snugs or projections which can be entered into any of the spaces between the bottom and front bars, and also other snugs resting on the bars, and the air passing from below through the perforations to the ignited fuel sends more heat than usual into the apartment or place in which the fire place is used, and at the same time the air prevents the back from burning away, and in kitchen ranges side plates can be used for diminishing the capacity of the fire place longitudinally, and preventing the fuel from passing below the boiler or oven when not in use, and in all cases it will be found that in consequence of the diminished capacity of the fire place and the propulsion of the heat into the apartment there will be great economy in fuel.

A.D. 1873, February 6.—No. 440.

JOSEPH, JOSEPH, of the firm of B. H. Joseph & Co., jewellers, of Birmingham, in the county of Warwick.—“Improvements in a tachable and detachable dress, flower, or bouquet holders, to be used as brooches or other personal ornaments.”

The novelty of this invention consists in so fashioning and arranging brooches or other like ornaments, that while being unique in themselves are constructed and adapted for holding natural or artificial flowers.

A.D. 1873, February 6.—No. 441.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Messrs. Garau Ticozzi and Co., of Milan, Italy.*)—"Improvements in electrical brakes for railway trains."

The principal object of this invention is the construction of a brake which may be operated in case of danger either by the engine driver or the guard. The electrical mechanism occupies but little space. The said mechanism has two bobbins with coils of conducting wire whose extremities are fixed to the two poles of a battery. The circuit may be established or interrupted by means of a button placed within reach of the driver. To the frames of the said bobbins is fixed an armature. Above this part of the apparatus there is a drum which turns upon two pivots, and which carries a cord provided with a weight. When the apparatus is set the button is pressed, the electric circuit is closed, the bobbins are magnetised and attract the armature, which causes the hollow cylinder to turn on its pivots. The weight can then descend and turn the said drum, which through suitable bevel gearing closes the braks.

A.D. 1873, February 6.—No. 442.

DEAN, WILLIAM, gas engineer, of Bradford, and LANCASTER, ROBERT, engineer, of Shelf, near Halifax, both in the county of York.—"Improvements in gas regulators."

A guide or parallel motion is employed preventing the balloon or diaphragm working sideways. It is made by a continuation of the valve spindle working through a metal bush on which is fitted a metal cap; the balloon or diaphragm is also made larger and in proportion to the requirement.

A.D. 1873, February 6.—No. 443.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Joseph Reckendorfer, of the city, county, and state of New York, United States of America.*)—"An improved combined pencil and eraser."

This invention relates to lead or crayon pencils having an india rubber or other like eraser at one end of the same, and consists essentially in making a wooden cased lead pencil or crayon of equal or practically equal diameter throughout the entire length, into one portion of the length of which is inserted and cemented in the usual manner the lead or crayon, whilst within the remaining portion from the opposite end of the said wooden case or covering is formed a cylindrical chamber for the reception of a cylindrical piece of india rubber or other like eraser which may be cemented in its place like the lead or crayon crayon, the same wooden case serving to inclose both the lead or crayon and the cylindrical piece of eraser.

A.D. 1873, February 6.—No. 444.

NEWTON, ALFRED VINCENT, of the Office for Patents, 66, Chancery Lane, in the county of Middlesex, mechanical daughtsman.—(*A communication from George Byron Kirkham, of the city and state of New York, United States of America.*)—"Improvements in treadle motions."

The object of this invention is to provide a foot power or treadle motion suitable for sewing machines, jig-saws, handlathes, and other light machinery, which require the driving shaft or fly wheel always to be turned in the right direction and with a noiseless and positive power.

A.D. 1873, February 6.—No. 445.

MACKIE, SAMUEL JOSEPH, of No. 3, Delahay Street, Great George Street, in the city of Westminster.—"Improvements in the manufacture of explosive compounds, and in the apparatus used in such manufacture."

This Provisional Specification describes apparatus for steeping cotton pulp or waste in an acid bath, placing it in digesting pots, and removing the pots in a cradle by a crane to the cooling pond. Freeing gun cotton from acid by passing it through rollers. Apparatus for ascertaining the amount of dry gun cotton in a mass of wet material. Apparatus for granulating compound of cotton gunpowder. Apparatus for giving any desired density to granules of cotton gunpowder.

A.D. 1873, February 7.—No. 446.

PRINCE, ALEXANDER, of the Office for Patents, 4, Trafalgar Square, Charing Cross, in the county of Middlesex.—(*A communication from Ferdinand Flinsch, of Offenbach on Maine, in the Empire of Germany.*)—

“Improvements in mechanism or apparatus to be employed for packing into parcels tobacco or similar and like substances.”

The novelty of the invention consists in providing an intermittent revolving table, supplied with moulds and moveable tubes for containing tobacco or other similar material, with self-acting mechanism, that when put in motion by the moving of the said table will bring into action a novel arrangement of apparatus that will, after the tube has been filled and pressed by a rammer, lift it from the mould and pass it on to the folder, and then finally compresses the packet when folded and ejects it from the machine, a tumbler lock being provided that will steady and regulate the position of the table during the action of the rammers.

A.D. 1873, February 7.—No. 447.

BROWN, ROBERT, of Edinburgh, in the county of Mid Lothian, North Britain, brassfounder.—“Improvements in and connected with stop valves or taps.”

The improved valve or tap comprises a body part and a connecting part. The connecting part, which is to be soldered or otherwise joined or coupled to the supply pipe, is formed with a valve seat, and is provided with a conical or disc valve which opens against the pressure. The body part is made to screw into the mouth of the connecting part, or it may be attached by means of flanges and screws. In one modification of the body part it is made with a valve seat, and is provided with a conical or disc valve opening against the pressure like that of the connecting part, and either of the valves is made with a projecting spindle, whereby the valve of the connecting part is pushed open by the valve of the body part when the latter is open. Any known construction of the body part and its valve may be adopted, provided the entering end is arranged to push open the valve in the connecting part.

A.D. 1873, February 7.—No. 448.

ROBERTSON, JAMES, of the city of Glasgow, in the county of Lanark, North Britain, engineer.—“Improvements in motive power and blowing engines, parts of which are applicable to meters for measuring liquids.”

This invention has reference to improvements on several parts of rotative valveless engines, forming part of the invention for which Letters Patent were granted to the petitioner, dated 14th October 1868, and numbered 3146. And the nature of these new improvements consists as follows:—First, in transmitting the reciprocating and oscillatory motion of the piston and rod from an arm keyed on the latter, by a new cylindrical bush with conical ends oscillating in its outer end, to receive the pin of a crank or disc on a crank shaft, and thus transmit circular motion thereto direct, without the usual connecting rod. Also in casting and forming the cylinder cover (or covers when there are two set in the same line in front of each other, with the crank shaft close to these, as in these engines without connecting rods) in one piece with the guide bushes and block or bracket of the neck bearing of the crank shaft, so that when this bracket and its cover or covers are bolted to the flanges of the cylinder or cylinders, the whole would form a compact portable engine ready for bolting to its foundation by flanged snugs or feet cast on the cylinder and said bracket piece without the necessity for a cast iron bed plate. Although hitherto only the long pistons of valveless engines have been made to oscillate and reciprocate within their cylinders, and transmit this motion into the circular motion of the crank shaft, by a simple arm secured on the piston rod with ball and bushes or other equivalent, as a crank pin, it is to be understood that this mode and means of transmitting circular motion may be applied to ordinary constructions of engines, whether with short pistons, or ordinary valves and valve gearing, which improvements will highly polish the working surface of the cylinder and piston, and dispense with the connecting rod in ordinary engines thus made, and also make them much more compact. Motive power engines of this form having the oscillating arm communicating motion to the crank pins in lieu of the ordinary connecting rod, may communicate motion to disc valves placed in the cylinder covers by having a groove cut in the piston rod and the disc valves bored out to fit the rod, with feathers in each to receive the oscillating motion of the rod, inlet and outlet ports being formed in the cylinder covers, and corresponding ports formed in these disc valves. Disc or other valve gear may also be wrought from the oscillating arm or driver, keyed on the piston rod, by a cam or lever, or by having a segment of a wheel with teeth formed on it to gear with a pinion on a rocking shaft, to communicate motion to the inlet and outlet valve or valves.

An improvement in this class of motive power engines and liquid meters, having reciprocating pistons working in their cylinders, consists in forming these pistons of thin narrow end discs fitting the cylinder,

with packing rings in their periphery, somewhat like thin ordinary pistons, and placing long thin segmental pieces between them, the segmental pieces having flanges at their ends to bolt them to the end discs of the piston, having the inlet and outlet ports formed within the segmental pieces to open to ports formed near the central length of the cylinder. An improved means of making this form of combined valve and piston fluid pressure tight consists in inserting a ring piece to move easily within the inlet port of the cylinder, made to bear at its inner end on the surface of the piston, by a spring, the pressure of the inflowing fluid, or other equivalent means, and fitting the curved surface of the piston accurately, prevents the fluid from escaping otherwise than into the inlet port of the piston. Another improvement consists in placing a cross vane or vanes inside this form of long pistons described, extending the whole length between the disc or piston ends, making a fluid tight fit and joint by its protruding ends made to work in two parallel grooves cut along the cylinder. This vane has a cylindrical boss formed on its centre, extending between the piston ends, and made an easy working fluid tight fit into a corresponding recess turned out between the segmental port pieces; and in one form has inlet and outlet ports formed in these segmental port pieces, and the boss formed in the centre of the vane, this vane thus having free reciprocating action in the longitudinal direction of the cylinder, but to prevent the oscillating motion which the piston receives from the arm driver keyed on the piston rod connected to the crank, this piston having a set of ports of the ordinary valveless engine form, for the induction and eduction of the acting fluid. By another set of ports through the cylinder and piston, the fluid is also admitted to and from the opposite sides of each end of this vane, and thereby an oscillating and twisting motion is given to the piston and rod, the piston and engine thereby having no dead centre, thus starting freely at whatever position the crank on the crank shaft may be placed. By also making the piston long, the vane may be made to induce and expel the same quantity of the fluid as is expelled from the ends of the piston, and thereby made to induce and expel a continuous, or nearly continuous, current. To increase the useful effect of the vane inside the piston, it may also be made in a triple vane form, so as to receive and expel a greater quantity of fluid. This improved piston is peculiarly suited for water meters, and may be packed with rolling india-rubber packing, as also for forcing air, having the advantage of producing a continuous current, while for use as a steam engine it has the advantage of starting freely at any position of the crank or stroke.

Another improvement in these valveless engines consists in a mode of reversing compound steam and air engines, by reversing the steam by double beat slide or other forms of valves, and making it, when the engine is working in one direction, pass in by the exhaust ports in both cylinders to give reversing action without other gear; and for obtaining expansive action. The high pressure cylinder by this improvement would be made small enough to give or produce the amount of expansive action required in the second cylinder. The pistons may be on one piston rod, and connected by an arm driver to a crank, or there may be two engines coupled by a crank shaft and two cranks; and another improvement consists in trapping the condensed water formed in the large or non-condensing cylinder by a set of small ports formed in the lower side of the piston and cylinder, similar in form to the exhaust ports for the steam, the water being trapped off before the exhaust steam is expelled from the cylinder.

A.D. 1873, February 7.—No. 449.

DOLBY, THOMAS GEORGE FONNEREAU, of 22, Camberwell Green, in the county of Surrey, goldsmith.—“Improved means or apparatus for saving life at sea.”

According to this invention water bottles, such as those with which emigrants are always provided, are constructed so that they can be readily fitted to the chest in cases of emergency, and thus constitute a life-saving apparatus.

A.D. 1873, February 7.—No. 450.

MAQUAY, SAMUEL WILLIAM, of Charlemont Terrace, in the city of Dublin, Ireland.—“Improvements in the construction of furnace retorts to be employed in connection with other apparatus for the manufacture of gas.”

This invention consists in constructing furnace retorts for manufacturing and generating gases upon a continuous principle, in which revolving tubes are employed for inserting the charges.

A.D. 1873, February 7.—No. 451.

JONES, RICHARD, of Tower Hamlets Road, Stratford, in the county of Essex.—“An improved Davy's safety lamp.”

This invention consists in extinguishing the flame in Davy's safety lamps on any attempt being made by miners and others to remove to light therefrom.

A.D. 1873, February 7.—No. 452.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from George F. Blake, of Boston, Massachusetts, United States of America.*)—"Improvements in valves and parts connected therewith for direct-acting steam-engines."

This invention relates to the valves and ports of direct acting engines for the purpose of obtaining a perfectly sure and regular movement, and overcoming difficulties heretofore experienced, and consists in arranging the main slide-valve upon a movable seat, which is itself a valve, and is provided with suitable parts so that it may operate as the main valve of the engine under certain circumstances when the ordinary valve would fail; and further, in certain improvements in the arrangement of the auxilliary valve and ports, and in the construction of the motive piston or plunger.

A.D. 1873, February 7.—No. 453.

GUATTARI, AUGUSTO, of Buckingham Palace Road, in the county of Middlesex.—"Improvements in pneumatic telegraphs."

My invention relates 1st to an improvement in the pneumatic telegraph apparatus for which I obtained Letters Patent, No. 2797-1871, and consists in a modification of the transmitting instrument by the application to the air conducting tube of a regulator by which the air contained therein may be compressed more or less as required, so as to regulate the tension of the air according to the distance to which the signal is to be transmitted instead of varying the movement of the transmitting bellows or piston.

My invention relates 2ndly to an instrument which serves either as transmitter or receiver, in which only one dial is employed to indicate the signals sent and received. The needle working over the dial is operated by an anchor propellant, and the instrument comprises a compressible air bag or bellows for transmitting when the index needle may be worked by a spring push rod acting on the anchor propellant, or by the pressure of the air in the line or conducting tube. For receiving, it is actuated by the movements of a rod connected to a flexible diaphragm on the end of a branch tube connected with the main tube so as to be inflated or vibrated by the impulse of the air in the tube.

The invention relates 3rdly to an arrangement of the combined transmitting and receiving instruments specially adapted for use on board ship, such instruments are disposed at different parts of a ship, with any one of which the captain's instrument may be made to communicate by means of a commutator cock.

A.D. 1873, February 7.—No. 454.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from George F. Blake, of Boston, Massachusetts, United States of America.*)—"Improvements in valves and parts connected therewith for direct-acting steam-engines."

This invention consists in arranging a single-slide-valve in combination with suitable ports in such a manner that the said single slide valve shall perform the functions both of the main valve and of a secondary valve.

A.D. 1873, February 7.—No. 455.

SHAW, JOHN, of Hull, in the county of York.—"Improvements in heating, which improvements are applicable to the exhausting of the steam from the cylinders of steam engines, steam hammers, and other like apparatus."

This invention has for its object,—

First. The partial or entire separation of the oxygen and hydrogen in steam (or water vaporized) for the purposes hereinafter specified.

Secondly. The employment of the oxygen in steam (or water vaporized) as a supporter of combustion in coal or coke fires (including those for smelting furnaces) for industrial, domestic, social, or navigation purposes.

Thirdly. The employment of the hydrogen in steam (or water vaporized), either as hydrogen alone or as a compound of hydrogen with carbon, or with oxygen, or with both carbon and oxygen as a fuel or combustible, which is consumed on the spot close after its separation or liberation for producing or generating heat or caloric for industrial, domestic, social, or navigation purposes.

Fourthly. The employment of the heat or caloric in steam (or water vaporized) for producing or generating fresh steam (or water vapour), or for smelting purposes.

Fifthly. The partial or entire exhausting of the steam (or water vaporized) from the cylinders of steam engines, steam hammers, and such like apparatus, by conveying it, after it has exerted its force upon the pistons, from the cylinder or cylinders to the fire.

A.D. 1873, February 7.—No. 456.

JAMES, JOHN HOBY, of the Seedley Printing Company, of Pendleton, in the county of Lancaster.—"Improvements in the production of ornamental surfaces."

This invention consists in ornamenting surfaces on a plain, dyed, or printed state by block printing their patterns in a mixture of oil and size or other suitable adhesive or glutinous material, the same block or one of similar pattern is then caused to take up on its pattern surfaces, gold coloring matter in a dry state, and the block is again impressed upon the part of the fabric which has already been printed with oil and size or other suitable adhesive or glutinous material, and upon that surface so printed the gold pattern.

A.D. 1873, February 7.—No. 457.

FLETCHER, WILLIAM, of No. 22, Hornsey Road, Holloway, in the county of Middlesex, engineer.—"Improvements in obtaining motive power applicable to the propulsion of tramway carriages and for other uses, and in the means or apparatus employed therein."

This invention relates to the use as a motive power of water under spring or weight pressure acting on rams extending through cylinders closed by covers and having annular spaces for the water to act on the piston between the rams and the interior of the cylinder. Also to the application of the invention to forcing water for fire engines and other uses. For which purpose an annular ring piston working between the outer surface of each motive power cylinder and a cylinder surrounding it may be used.

A.D. 1873, February 7.—No. 458.

LAFARGUE, ALPHONSE, of No. 7, York Terrace, Acklam Road, Westbourne Park, in the county of Middlesex, engineer.—"Improvements in the production of gas or vapour from hydro-carbon oils, or combinations thereof with other matters, and in means or apparatus employed in utilizing the same."

This invention relates to the introduction of steam into petroleum, or other hydrocarbon oil, in order to the production of combined gas or vapour for use when lighted in heating or otherwise.

Also in some cases to the combination with such oil of highly-rectified petroleum, or such like spirit, and the use of a low pressure of steam to liberate the gas.

Such oils may also be combined with gas-tar, or Stockholm tar, to render them inflammable.

A.D. 1873, February 8.—No. 459.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws.—(*A communication from Michael Cookerly, of Baxter Springs, Kansas, United States of America.*)—"Improvements in hoes."

My invention consists in the peculiar shape of the hoe-blade and the manner of its attachment to the handle. The shape of the said blade is rhomboidal, and it is attached to the handle in such a manner that the blade will be about horizontal while in operation.

A.D. 1873, February 8.—No. 460.

RODDIS, JOHN, of Birmingham, in the county of Warwick, manufacturer, trading under the firm of "John Roddis and Company."—"An improved chimney cowl."

My improved cowl is closed at the top, but is fitted at the sides with any equal number of valves, these being by preference two or four in number, and are so fitted that the valve or valves on the one side is or are connected by a metal rod or rods with the corresponding valve or valves on the opposite side; and these said valves being hung or suspended by loops or hinges, are free to open and close as may be required; and each corresponding or opposite set of valves being connected by the said rods are acted upon by the atmosphere in such manner, that a storm or current of wind blowing against any one or more of the said valves close them, but open those other of the said valves on the opposite side of the cowl with which they are connected, as aforesaid, and through which the smoke of the chimney is then free to escape.

A.D. 1873, February 8.—No. 461.

PRINCE, ALEXANDER, of the Office for Patents, 4, Trafalgar Square, Charing Cross, in the county of Middlesex.—(*A communication from Ferdinand Flinsch, of Offenbach on Maine, in the Empire of Germany.*)—"Improvements in mechanism or apparatus to be employed for distributing color upon continuous or endless lengths of paper or other material."

The novelty of the invention consists in distributing color uniformly on the continuous lengths of paper whilst passing over a revolving cylinder by means of a felt covered roller conveying color to the same from a color trough and four or more brushes actuated by cranks and universal joints which give to the brushes a

compound motion that evenly and uniformly distributes the color over the whole upper surface of the traversing paper, from whence it is conveyed in the ordinary manner by means of rollers positively driven by endless chains and toothed wheels into a chamber or space for the purpose of being dried.

A.D. 1873, February 8.—No. 462.

COLLINS, CHARLES UPTON, of Birmingham, in the county of Warwick, brassfounder, and **ARNOT, JAMES**, of Birmingham, aforesaid, accountant clerk.—“Improvements in lock and latch furniture.”

According to this invention a back is inserted in the rose and secured by the turning over of the outer edge of the rose upon the back. A support to the spindle and stop to the knob are thus formed. The rose is attached to the knob by burnishing or turning over the edge of the central hole of the rose upon a flange on the neck of the knob. The spindle in rim and latch locks is notched or stopped for limiting the distance to which the follower can pass onto the spindle. The mounts of china and non-metallic knobs are fixed in the rose by a back which is burnished or spun upon the rose. Or the back is dispensed with and that part of the mount passing through the rose is compressed so as to secure the edge of the hole in the rose between two flanges on the mount. The tendency of the knob to get loose in the mount is prevented by projections on the inner face of the mount taking into recesses in the neck of the knob.

A.D. 1873, February 8.—No. 463.

GROUT, WILLIAM HENRY JAMES, of Watson Street, Stoke Newington, in the county of Middlesex, engineer.—“Improvements in wheels for carriages, velocipedes, and other vehicles for common roads.”

This invention consists in improvements on an invention for which Letters Patent were granted to me, and dated the first day of December 1870, No. 3152, the said improvements consisting in forming the tyre of tubular india rubber of alternate large and small diameter, through which passes a metal rod for fixing the same on the felloe; in improved nuts for receiving the outer ends of the spokes; also in forming two spokes out of one piece of metal, the spokes being held in the nave or stock of the wheel by semicircular pieces of metal cast thereon.

A.D. 1873, February 8.—No. 464.

SCHLESINGER, WILLIAM JAMES, of Finsbury Street, in the county of Middlesex, merchant.—(*A communication from C. Dixon, of the city and state of New York, United States of America.*)—“Improvements in machines for seeding or stoning raisins.”

This invention relates to machines provided with a grate and expelling and compressing jaw arranged to act to expel the seeds and to discharge them and the seeded or stoned raisins. The said machine has a novel arrangement and construction of the compressing, expelling, and grate jaws of the raisin seeder, and also a novel arrangement of other parts in addition to the said jaws.

A.D. 1873, February 8.—No. 465.

SCHLESINGER, WILLIAM JAMES, of Finsbury Street, in the county of Middlesex, merchant.—(*A communication from W. L. Grout, of Boston, Massachusetts, United States of America.*)—“An improved universal tool or implement chiefly designed for warehouse and household purposes.”

My said improved tool or implement comprises an adjusting spanner for screw nuts and bolts, a pipe wrench, an ordinary nail hammer, and a tack and claw hammer, a screw driver, a bed key, and a holder for the reception of a gimlet, brad awl, or other like instrument.

A.D. 1873, February 8.—No. 466.

GRATTON, THOMAS, and **BEAL, JOHN**, both of Ambergate, in the county of Derby.—“Improvements in the construction of wheels and tires for railways.”

The wheel has on the inner side a projecting flange with a dovetail groove; the tire has a corresponding rim and has on the opposite side a flange projecting inwards and formed with a dovetail, into which the correspondingly formed outer side of the rim of the wheel fits. Wheel and tire are united by set screws in a particular manner and are by preference flush.

A.D. 1873, February 8.—No. 467.

KING, JAMES, KING, JAMES MAXWELL, and **KING, THOMAS DUNDAS MAXWELL**, all of 5, Moscow Terrace, Victoria Park, in the county of Middlesex.—“Improvements in apparatus applicable to railway platforms to prevent persons entering and leaving trains in motion, and for other such like purposes.”

This Provisional Specification describes the application of a fence along the edge of a railway platform, and which is capable of being raised or lowered at pleasure by a lever handle. The same handle works a starting signal.

A.D. 1873, February 8.—No. 468.

KING, JAMES, KING, JAMES MAXWELL, and KING, THOMAS DUNDAS MAXWELL, all of 5, Moscow Terrace, Victoria Park, in the county of Middlesex.—“An improved coupling for repairing propeller shafts “ at sea.”

This Provisional Specification describes a clip coupling of a special construction and which boxes in the fractured part of the shaft, whether the fracture be in the middle of a length or at the junction of two lengths.

A.D. 1873, February 8.—No. 469.

PARRATT, GEORGE FREDERICK, of No. 19, Wilton Street, Grosvenor Place, in the county of Middlesex.—“Improvements in life rafts.”

This Provisional Specification describes constructing rafts similar to those described in the Specification of Patent No. 2592, of 1853, with a decking of canvas, together with network, and applying inflated air cylinders to the central spar; also forming each of the several air cylinders into numerous compartments.

A.D. 1873, February 8.—No. 470.

HADWEN, JOHN WILSON, of Bradford, in the county of York, yarn merchant, and RANDOLPH, ARTHUR, of Bradford aforesaid, yarn merchant.—“Improvements in or applicable to machinery or apparatus for spinning wool, cotton, silk, flax, or other fibrous substances.”

This invention relates to the spinning of the rovings of fibres, and the means therefor, in the condition as they are delivered from the condenser, without further draught. This is effected by passing the rovings through a pair of rollers (without giving draught thereto) to the spindles of the spinning apparatus, where it is spun and made into yarn; and, also, to means and apparatus for drawing or attenuating the strips or rovings after being taken off the condenser or other carding engine. This is effected by a miniature carding engine as described.

A.D. 1873, February 8.—No. 471.

FAWCETT, THOMAS CONSTANTINE, of Leeds, in the county of York, engineer and machine maker.—“Improvements in brick making machines.”

This invention relates to improved construction of dies for pressing and forming the face of the brick, and improved means and apparatus for ensuring and securely holding the cylinder in proper position for the action of the presser die, for operating the plungers, for removing the brick from the moulds when formed, for lubricating the plungers and moulds; and also in the use and employment of a cam for actuating the feed-bar in lieu of a crank, so as to distribute more evenly the pressure or strain on such bar.

A.D. 1873, February 8.—No. 472.

TASKER, HENRY, of the firm of Tasker and Sons, of Waterloo Iron Works, near Andover, in the county of Hants.—“Improvements in machinery for elevating corn, hay, straw, and other agricultural produce.”

This invention has for its object improvements in the construction, arrangement, and combination of elevators or machines for elevating straw, corn, hay, or other agricultural produce, whereby the trough or part of elevator up which the produce is carried may be used of a great length, and is also capable of being conveniently packed for travelling, or whilst out of use.

A.D. 1873, February 8.—No. 473.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Deborah Shedd, of the city and state of New York, United States of America.*)—“Improvements in apparatus for producing an equal distribution of heat in the tubes of “ locomotive and other similar steam boilers.”

The said invention relates to a simple contrivance whereby the heat generated in the furnace of a locomotive or similar steam boiler is caused to pass equally through all the tubes of the same. In applying this invention to a locomotive boiler I place in front of the openings of each row of boiler tubes in the fire-box a tube with bent ends which opens into the boiler above and below the boiler tubes, and which being filled with water and steam will not be destroyed by the fire. In the case of boilers already in use I use iron bars. By this contrivance the heat is distributed equally between the whole of the boiler tubes.

APPENDIX
TO
CHRONOLOGICAL AND DESCRIPTIVE INDEX,
CONTAINING THE

Abridgments open to public inspection before the expiration of the term of six months (in consequence of the Patentees having filed their Final Specifications), and also the Abridgments of Complete Specifications received from August 2 to August 8, 1873. These Abridgments will be subsequently printed in the body of the book, in order to preserve the numerical and chronological arrangement.

A.D. 1873, February 10.—No. 479.

SIPRIOT, CASIMIR, of Milan, in the Kingdom of Italy, merchant.—“An improved apparatus for exhibiting placards, posting-bills, and other advertisements.”

The invention consists in a peculiar construction of apparatus for effecting a continuous or intermittent passage or travel of the placard or other advertisement before the eyes of persons passing by.

A.D. 1873, February 10.—No. 481.

PINKER, JOHN, of Liverpool, in the county of Lancaster.—“Improvements in lowering and raising ships’ boats, and in the apparatus employed therefor.”

The features of novelty which constitute this invention consist in lowering and raising ships’ boats clear of the ship’s side by means of a novel construction of davit, which is hinged or jointed to the ship’s side just above the water line. The davit passes underneath the boat, and bends over the boat inboard. The two davits carrying the boat are stayed or braced together, and are worked by a toothed quadrant and pinion, which is driven, regulated, and governed by an hydraulic or steam cylinder or cylinders. In connexion with the apparatus there is a pulley and tackle to enable the davits to be raised after the boat is lowered, or to raise the boat with the davits. This pulley and tackle may act conjointly with the hydraulic or steam cylinders, or independently.

A.D. 1873, February 10.—No. 484.

DAELEN, VITAL, of the New Steel Works, Bochum, province of Westphalia, Empire of Germany.—“Improvements in the manufacture of wheel tyres and other similar hoops or rings.”

This invention relates to the manufacture of weldless tyres or hoops out of a ring of cast steel or iron in such a manner that during the whole working or process the whole portion of a ring or tyre section, that is to say all the four sides of one section, are subjected to compression, and all particles or fibres of the material are equally compressed.

A.D. 1873, February 11.—No. 495.

NANGLE, WALTER CHIDIOCK, of Bull Point, near Devonport, in the county of Devon, late Captain Royal Artillery, now Assistant Controller, Bull Point Establishment.—“A new or improved composition or paint to be used for coating metal and other substances.”

This composition or paint is composed of coal tar, rosin, plaster of paris, dry red lead, spanish brown, and benzoline.

The rosin is first dissolved by heat, then mixed with the plaster of paris; to these are added some tar, red lead, and spanish brown, and when well mixed the remainder of the tar and other ingredients are added, and the whole boiled. When cold the benzoline is added.

This paint is particularly recommended for preserving iron, but may also be applied with advantage as a coating for other metals and substances.

A.D. 1873, February 11.—No. 497.

FISKEN, DAVID, of Stamfordham, in the county of Northumberland, gentleman.—“Improvements in rope porters for steam ploughing machinery.”

That part of the porter placed in the ground I form of steel prongs sharpened at the lower end which I secure to a stake or extend upwards so as to form part of brackets which hold the pulley stud upon which the pulley is mounted loosely. In the former case the brackets are secured to the upper part of the stake, but in either

case they are carried up above the pulley, and their ends turned inwards and aslant so as to prevent the rope running off the pulley when the pulley is in a line with the latter, but so as to allow of the rope being immediately removed by simply turning the porter slightly.

A.D. 1873, February 12.—No. 514.

NEWELL, WILLIAM, of Birmingham, in the county of Warwick.—“Improvements in ornamenting certain articles or parts of articles made of tin plate, and in apparatus to be used for that purpose.”

This invention consists in ornamenting the bodies, lids, and feet of tea pots and other vessels, plate covers, waiters, and other articles, or parts of articles, made of tin plate in the following manner.

The body or part of the article to be ornamented is placed in a concave or hollow steel die having the general figure of the article to be ornamented. The said die being engraved or sunk internally with the required design or ornament. A rotatory motion being given to the die and the article within it by means of a lathe or other machine, a pressing or burnishing tool is pressed with great force against the rotating body and the metal of the said body is pressed against the interior of the ornamented die and thereby made to receive, or is impressed with, the design or ornament on the die. In this way various articles, or parts of articles, of tin plate may be ornamented.

A.D. 1873, February 12.—No. 520.

BARFF, ARTHUR, of Merton, in the county of Surrey, gentleman.—(*A communication from Joshua Kidd, of New York, United States of America.*)—“Improvements in the utilization of heat for the generation of steam and in apparatus or appliances employed therefor.”

The following are the essential features of this invention—

First. The application of a jet or jets of superheated steam escaping under pressure when used for exhausting the products of combustion from a fire and forcing or impacting the same against the tubes of a steam generator and also for forcing the said products of combustion through suitable pipes or radiators for heating or vaporizing purposes or for extinguishing fires.

Secondly. The placing an auxilliary tubular boiler made of any required shape between the furnace and smoke stack when such auxilliary boiler is combined with an artificial steam jet draught placed between the furnace and said boiler.

Thirdly. Uniting or combining an auxilliary tubular steam generator with the primary boiler or with a separate tank containing the bulk of the water under pressure.

Fourthly. The combination of a jet or jets of super-heated steam with a steam generator made of any required shape when such jet or jets is or are placed between the fire and steam generator and used for the purposes set forth.

Fifthly. A steam generator made of small vertical tubes having its steam outlet at the top and its water supply pipe connected and open from its lowest part to the supply tank so that when the pressure increases in the generator it will drive the liquid further away from the hottest part of the tubes back to the supply tank, and vice versa.

Sixthly. The combination of a super heated steam jet or jets with a hot air chamber or drying room when the said jet or jets is or are placed between the fire and hot air chamber and used for the purposes set forth.

A.D. 1873, February 12.—No. 521.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from George Laning Kitson and George Washington Carr, both of the city and county of Philadelphia, state of Pennsylvania, United States of America.*)—“Improvements in automatic regulating valves.”

The object of this invention is to dispense with the costly governors used in connection with steam engines, and this object is attained by a valve chest forming part of the passage for the conveyance of steam from the boiler to the engine and containing a valve so weighted and so exposed to the action of the steam from the boiler that any alteration in the speed of the engine or any change in the pressure of steam in the boiler causing difference of pressure on opposite sides of the valve in the chest will induce the said valve to expose or obstruct the passage in the chest to an extent proportionate to any increase or decrease in the speed of the engine or in the pressure of the boiler.

A.D. 1873, February 12.—No. 522.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Everett Griscom Passmore, of Philadelphia, Pennsylvania, United States of America.*)—“Improvements in lawn mowing machines.”

This invention relates to improvements in lawn mowing machines, and more especially to hand lawn mowers having a revolving cutting apparatus driven by two driving wheels, and consists, first, in arranging the gearing so that any required speed can be communicated to the cutters, the said gearing being conveniently protected by the driving wheels and side plates or frame of the machine. Secondly, in arranging the gearing and studs or shafting on which it turns so that different sized cog-wheels supplied with the machine may be conveniently used or interchanged to give any required speed to the cutters.

A.D. 1873, February 12.—No. 523.

LYON, REUBEN, of Bristol, in the county of Gloucester, silversmith.—“Improvements in apparatus for communicating between the passengers and guards, and between the guards and engine driver of a railway train.”

This invention consists of bellows fitted to each compartment of a railway train, such bellows communicating with a pipe extending along the entire length of the train and provided with a whistle at each end, the same pipe forming also a speaking tube between the guards and driver. On pulling down a handle in any one of the compartments, the whistles are sounded, and at the same time a signal is shown indicating in which compartment the apparatus has been used.

A.D. 1873, February 17.—No. 583.

OWEN, WILLIAM, of Rotherham, ironfounder, and HILL, JOHN, of No. 1, Westfield Terrace, Rotherham, in the county of York, manager of an iron foundry.—“Improvements in stove grates and in appliances connected therewith for absorbing and diffusing heat.”

This relates to the construction of movable or hinged cast iron canopies to stoves, such canopies having fins or gills or rays cast on them for absorbing the heat from the fire, and thus warming the air coming in contact with it externally, whereby the heat becomes diffused and is utilized for warming the apartment.

A.D. 1873, February 19.—No. 614.

CHANEL, CESAR, of No. 10, Rue de la Fidélité, Paris, in the Republic of France.—“An improved fuel.”

The invention consists in agglutinating or agglomerating begass (the ligneous residuum of sugar cane, after extraction of its juicy or saccharine principle) with resin, coal tar, or pitch, or any like agglutinating and combustible matter for the manufacture of fuel.

A.D. 1873, February 26.—No. 710.

METGE, EUGÈNE, and VUIBERT, FÉLIX NICOLAS CYPRIEN, both of Boulogne sur Mer (France).—“An improved mode or process of preserving meat.”

This invention relates to a method or process of preserving meat in bulk in its fresh uncooked condition.

The animal is killed by felling and immediately skinned and cleaned. It is then glazed over with a preparation of sugar and alcohol and placed in a case in a bed of fat. The case is exhausted of air and soldered up.

A.D. 1873, June 10.—No. 2050.

HAYWARD, WALTER FRANK, of the city and county of Norwich.—“Improvements in iron safes, and in locks or fastenings for the same, part of which improvements are applicable for other purposes.”

Safes strengthened by angle pieces of peculiar forms. The doors of fire proof safes made very little larger than the interior of the safe.

Locks are made with a piece or pieces having a sliding motion, alone or in combination with the ordinary “lever” or “tumbler” for the purpose of locking or securing the bolt or bar.

A.D. 1873, August 2.—No. 2618.

PALMER, FREDERICK AUGUSTUS, of the city of New York, but at present of No. 5, Southampton Buildings, in the county of Middlesex, gentleman.—(*A communication from Charles Gaume, of the city of New York, in the United States of America.*)—“An improvement in electro-magnetic engines.”

The feature of novelty of this invention consists chiefly of an improved construction of the armatures whereby "pull back" or retardation is obviated.

The armatures consist of a central bar attached at its centre to the face of the wheel and having cross-heads formed upon them about midway between its centres and ends, the said crossheads having short bars formed upon their ends parallel with the central bar, and the ends of which project to equal distances upon the outer and inner sides of the said crossheads. The aforesaid wheel revolves in bearings in the frame of the engine and the said armatures are operated in connection with horse shoe magnets having coils connecting with a battery and with suitable appliances for successively closing and breaking the circuit.

A.D. 1873, August 6.—No. 2641.

BOUSFIELD, GEORGE TOMLINSON, of Sutton, in the county of Surrey.—(*A communication from Deborah Shedd, of the city of New York, United States of America.*)—"Improvements in the sewing mechanism of "sewing machines."

This complete Specification describes—

Firstly. A new kind of shuttle driver, arranged so that the shuttle can be removed from sewing machines, particularly from that class of said machines used for stitching books and pamphlets, and to this end it consists in a novel construction of the shuttle driver and its attachments, by which the shuttle is carried when the sewing machine is in operation, and by which the shuttle is removed when the driver is taken out of the machine, avoiding thus the necessity of providing an opening in the table of the machine for removing the shuttle, and enabling the shuttle to be removed when the table of the machine is carried by a pamphlet partly finished, and which can not be removed without inconvenience.

Secondly. A new kind of needle made in such form that it can be threaded more conveniently; a large opening near the shank at the top being provided for the purpose of entering the thread, and the needle stem itself being split longitudinally from said opening to its eye into two parts, to allow the thread to be passed down to said eye.

A.D. 1873, August 7.—No. 2649.

DOUDS, DAVID, and HARTSUFF, JOHN HENRY, both of New Castle, in the county of Lawrence and state of Pennsylvania, in the United States of America.—"Improvements in steam pumps."

The invention relates to that class of steam pumps in which the steam is caused to act by direct pressure upon the water, and is directed alternately upon two chambers having a common steam and delivery pipe controlled by tilting valves in such a manner as to direct the steam alternately upon each chamber, one being filled with water while the other is being emptied.

It is well known that in pumps of this class their successful operation depends largely on the rapid condensation of steam in each chamber after the water has been expelled to produce a vacuum sufficient to close the steam valve and cause the water to rush in and direct the steam into the opposite chamber.

When the chambers become heated, however, condensation becomes more difficult in proportion to the degree of heat. Hence in the operation of pumps of this class much difficulty is experienced and hot water cannot be pumped.

The invention has for its object to produce a pump free from such defects, and which shall be rapid and effectual in its operation, simple in its construction, easy of repair, and require comparatively little steam; and consists—

Firstly. In connecting an air chamber or reservoir with the suction pipe of the pump.

Secondly. In the construction of the suction valves.

Thirdly. In the sectional construction of the pump casing, so as to be easily taken apart for inspection and repairs; and

Fourthly. In the general construction and arrangement of parts of the same.

The upper portion of the pump casing is composed of two tapering chambers made in one casting and separated by a partition. These chambers form at their top a wedge shaped recess, in which a wedge shaped tilting valve works and closes the entrance to the chamber alternately.

The lower portion of the casing is composed of a base containing the suction and discharge valves.

The suction valves rest on inclined seats, having two ports formed therein, which communicate with the suction pipe. These valves are held in place by casings, and are provided with lugs on their outer sides, which strike against said casings and prevent the valves from opening too far. The lower portions of these valves are formed with rounded edges, which rest in correspondingly shaped seats in the bottom of the casing.

A reservoir or air chamber is formed in the base between the suction valves, extending somewhat higher than the two chambers, and said air chamber or reservoir is provided at its upper part with a plug provided with a spring valve opening downward.

The base is bolted to the upper portion in such manner as to be readily taken apart for inspection and repairs.

A.D. 1873, August 7.—No. 2650.

JENSEN, PETER, of 89, Chancery Lane, in the county of Middlesex, engineer and patent agent.—(*A communication from James Boorman Johnston, of the city, county, and state of New York, in the United States of America.*)—"Improvements in railroad rails."

The object of this invention is to improve the construction of endless rails for rail roads in such manner as to render them more firm and strong, and durable than heretofore, and at the same time to reduce to as great a degree as possible the cost of their construction.

To these ends my invention consists in a continuous rail road rail which at any given section is composed of three parts breaking joints with one another, the two inner parts which constitute the body of the rail being secured together by an outer steel cap and the three parts strongly fastened together by means of bolts provided with an elongated head at each end, so formed as to fit the concave sides of the "web" or tread of the rail and are heated before they are inserted in the slots formed for their reception and by cooling they shrink and securely tighten the parts together.

These bolts may also in addition to the shrinkage be swayed up against the rails.

All screws, screw nuts, nut locks and other complicated and expensive parts are thus avoided.

Bowden, J., 399, Salt.
 Bowker, W., 3, Weaving.
 Bowra, M. E., 228, Elastic fabrics.
 Boynton, L. W., 98, Centrifugal machines and kilns.
 Braithwaite, J. C., 348, Weaving carpets.
 Bremerkamp, C., 61, Treating osier rods, &c.
 Brimley, C., 235, Reaping machines.
 Broad, J., 515 (*App. 4.*) Applying poultices.
 Broel, J., 385, Air-gas.
 Brook, J., 415, Carpets.
 Brooks, J. W., 822 (*App. 36.*) Boots and shoes.
 Broomhead, G., 320, Wire.
 Brotherhood, P., 287, Propelling machinery.
 Broughton, J., 256, Fire-arms.
 Brown, G., 426, Horse shoes.
 Brown, R., 447, Stop valves and taps.
 Brown, W. M., 822 (*App. 36.*) Boots and shoes; 1233 (*App. 40.*) Granulators; 1901 (*App. 48.*) Hydraulic hose.
 Browne, J. C., 277, Propelling vessels.
 Bruneau, L., 1644 (*App. 45.*) Hydro-caloric meters.
 Brunel-Bodin, L., 375, Blocking boots.
 Brunel-Marchand, I. F., 375, Blocking boots.
 Buckley, S. (*Hyde*), 44, Pipe wrenches and cutters.
 Buckley, S. (*Oldham*), 430, Charging and drawing retorts.
 Bull, T., 280, Washing machines.
 Bullock, A., 171, Preventing incrustation in steam-boilers.
 Bunster, C. E. W., 15, Aërial tramways.
 Buquoy, X., 2393 (*App. 2.*) Dredging machines.
 Burdon, W., 257, Steam vacuum pumps.
 Burgess, J., 307, Crochet needle handles.
 Burt, J. U., 57, Carriages.
 Burton, P., 47, Railway carriages.
 Büttner, F. L. A., 412, Tubular boilers.

C.

Cameron, J. A., 381, Presses.
 Canning, Sir S., 120, Ships' telegraphic apparatus.
 Capewell, G. J., 64, Nail extractors.
 Cardon-Wamain, J. T., jun., 203, Fibres.
 Carmichael, H., 72, Bleaching, dyeing and washing.
 Carr, D. A., 344, Railway signals.
 Carr, G. W., 521 (*App. 6.*) Automatic regulating valves.
 Carrington, W. T. H., 156, Fire-places; 427, Preventing the slipping of boxes or carriages used in wire-rope transport.
 Carty, B. F. Mc, 681 (*App. 35.*) Economizing fuel.
 Cathcart, J. L., 431, Screw propellers.
 Caton, J. B., 401, Pipe and cigar lighters.
 Cederholm, H. S., 1394 (*App. 42.*) Ships' logs.
 Chadwick, T. H., 430, Charging and drawing retorts.
 Chambers, R., 418, Cleaning wheat and other grain.
 Chancel, C., 614 (*App. 6.*) Fuel.
 Chapman, E. R., 434, Sewing-machines.
 Chapman, L., 2281 (*App. 1.*) Rotary pumps.
 Charlesworth, G., 114, Weaving.
 Chislett, J. R., 87, Medical electricity.
 Chodzko, N. F. B. de, 124, Steam-boilers.
 Clark, A., 278, Metallic revolving shutters.

Clark, A. M., 109, Condensing liquefiable matters; 189, Velocipedes; 237, Railway switches and points; 320, Wire; 355, Sifting shovels; 368, Artificial stone; 397, Ticketing shop goods, &c.; 433, Lining straw board, &c.; 1241 (*App. 3.*) Presses; 1428, (*App. 4.*) Fruit preserving cans, &c.; 2012 (*App. 49.*) Stone cutters; 2190 (*App. 52.*) Printing oil-cloth, &c.; 2420 (*App. 3.*) Tooth brushes.
 Clark, E., 611 (*App. 34.*) Raising and lowering ships.
 Clark, G., 286, Metallic and other vessels.
 Clark, J., 361, Railway breaks.
 Clark, W., 2583 (*App. 5.*) Propelling ships.
 Clarke, T. A. W., 108, Crimping hair.
 Claughton, H. O., 13, Cart saddles.
 Clayton, G., 148, Miners' safety lamps.
 Clean, F. Mc, 41, Raising ships.
 Clure, W. B. Mc, 13, Cart saddles.
 Cochrane, H., 1187 (*App. 40.*) Knives and forks.
 Cocker, J., 1084 (*App. 1.*) Spinning.
 Codd, H., 75, Bottles; 221, Tramways.
 Coignet, Son and Co., 305, Manure.
 Cole, F., 110, Air-engines.
 Colfs-Heyne, J. F., 425, Kilns.
 Collins, C. U., 462, Lock and latch furniture.
 Conder, E., 32, Mechanical motive-power.
 Cook, W., 408, Suspended wheels.
 Cookerly, M., 459, Hoes.
 Cooper, J., 16, Casting metals.
 Corliss, S. G., 300, Clothes wringers.
 Coubro, T. P., 185, Ships' sails.
 Coulter, J., 159, Governors.
 Cowles, E., 99, Cooling candle moulds.
 Cowper, E. A., 131, Sewing boots and shoes.
 Cox, J., 214, Extracting and recovering oils, fats, &c.
 Cox, S., 214, Extracting and recovering oils, fats, &c.
 Cox, S. F., 273, Leather.
 Coxeter, J., 302, Administering nitrous oxide gas.
 Craven, T. C., 22, Ginning cotton.
 Crispin, W. H., 122, Furnaces.
 Croll, A. A., 45, Distilling liquors, &c.
 Cumming, J., 267, Feeding paper to printing and other machines.
 Curtis, F., 769 (*App. 36.*) Paper-making; 1924 (*App. 48.*) Steam-boilers and engines; 2228 (*App. 52.*) Sewing boots and shoes; 2389 (*App. 2.*) Cutting precious stones.
 Cutter, J. M., 1646 (*App. 45.*) Valves.

D.

Daelen, V., 484 (*App. 6.*) Wheel tyres, hoops and rings.
 Davies, R. V., 210, Water waste preventers.
 Davis, C., 353, Preventing ships foundering; 354, Saving life and property at sea.
 Davis, G., 162, Ships' davits.
 Davis, J., 2353 (*App. 2.*) Tanning.
 De Boucherville, G. B., 2583 (*App. 5.*) Propelling ships.
 De Chodzko, N. F. B., 124, Steam-boilers.
 De Kercado, G. T., 104, Water meters.
 De Labarre, E., 321, Combinations of textile threads.
 De Rutenberg, Baron V., 360, Explosive compounds.
 De Ware, A. A., 304, Umbrella and parasol frames.

I.

Ibbetson, J., 378, Leather.
Imray, J., 309 Steam-boilers; 325, Heating, evaporating, distilling, &c.
Intyre, P. Mc, 424, Sharpening chisels, &c.
Ireland, W., 263, Wheel tyres.

J.

Jackson, W., 338, Heating feed water.
Jacobsen, F., 266, Manure.
James, J. H., 456, Ornamenting fabrics.
Jannet, E. H., 1517 (*App.* 44.) Railway carriage-couplings.
Jarman, H., 164, Steering ships.
Jasper, C. E. F., 407, Cigars.
Jaynor, A., 66, Steering and hoisting.
Jelley, R. S. C., 271, Cutting tenons.
Jensen, P., 149, Printing telegraphs; 2650 (*App.* 6.) Railroad rails.
Jewitt, H., 55, Toys.
John, W. H. St., 2527 (*App.* 4.) Purifying gas.
Johnson, A. F., 371, Fire alarm and water supply apparatus.
Johnson, J. H., 18, Spinning; 43, Transmitting power; 155, Fire-arms; 247, Signals; 305, Manure; 319, Self-setting animal traps; 356, Lamps; 405, Liquid fuel; 406, Tin foil; 443, Combined pencil and eraser; 521 (*App.* 6.) Automatic regulating valves; 522 (*App.* 6.) Lawn mowers; 1234 (*App.* 40.) Steam-engines; 1947 (*App.* 48.) Speed indicators; 2061 (*App.* 50.) Casting metals.
Johnson, J. O., 2342 (*App.* 2.) Fluid meters.
Johnston, J. B., 2650 (*App.* 6.) Railroad rails.
Jones, D., 372, Forcing inflammable fluid and liquid into furnaces.
Jones, E., 386, Cartridges.
Jones, F. L., 298, Weaving.
Jones, H., 187, Manure.
Jones, J. S., 283, Basting meat.
Jones, R., 451, Safety lamps.
Jones, R. C., 271, Cutting tenons.
Jones, S. B., 261, Railway carriages and platforms.
Jones, W., 118, Valves.
Joseph, J., 440, Brooches and bouquet holders
Joslin, W., 341, Furnaces.

K.

Kakmar, A., 5, Compasses.
Kay, T. B., 379, Carding engines.
Kerado, G. T. de, 104, Water meters.
Kesterton, H., 53, Rolling metals; 54, Metal telegraph posts; 253 Steam-boilers.
Kidd, J., 520 (*App.* 6.) Heating steam-boilers.
King, J., 467, Railway platforms; 468, Repairing propeller shafts at sea.
King, J. A., 116, Peat-fuel.
King, J. M., 467, Railway platforms; 468, Repairing propeller shafts at sea.

King, T. D. M., 467, Railway platforms; 468, Repairing propeller shafts at sea.
Kininmonth, J., 102, Bakers' ovens.
Kirkham, G. B., 444, Treadle motions.
Kirkman, J., 200, Governors.
Kitson, J. L., 521 (*App.* 6.) Automatic regulating valves.
Knevetl, A., 438, Fire-grates.
Knight, E., 806 (*App.* 36.) Lamps.
Knight, J., 234, Umbrellas, parasols and sunshades.
Knowles, M., 105, Weaving.
Kolb, A., 316, Ventilating closets, &c.
Konn, S. W., 91, Electrical heat.
Krausse, H., 80, Air-gas.
Kreb, F., 1584 (*App.* 44.) Printing telegraphs.
Kux, A., 422, Steam-boilers.

L.

Laak, L. Van, 1062 (*App.* 38.) Bungs and bung inserters.
Labarre, E. de, 321, Combinations of textile threads.
Lacon, W. S., 186, Lowering ships' boats.
Lafargue, A., 458, Oil-gas.
Lake, W. R., 26, Grinding corn; 27, Cleaning horses; 79, Thread spools; 80, Air-gas; 127, Pipe-joints, elbows or couplings; 225, Fireproof vaults; 226, Fireproof safes; 227, Boots and shoes; 279, Railway breaks; 290, Refrigerating; 300, Clothes wringers; 317, Breakwaters; 371, Fire alarm and water supply apparatus; 396, Treating middlings; 441, Railway electrical breaks; 452, Valves; 454, Valves; 473, Heating steam-boilers; 558 (*App.* 33.) Drilling and boring; 1737 (*App.* 46.) Veneers; 1770 (*App.* 1.) Traction-engines.
Lamb, J. G., 340, Spinning.
Lamb, J. W., 73, Knitting machines.
Lancaster, R., 442, Gas regulators.
Lanier, G. P., 130, Mattresses.
Larmann, F. W., 2481 (*App.* 4.) Tuyeres.
Lartigue, H., 247, Signals.
Larue, J., 172, Printing.
Latham, B., 331, Manure.
Laurette, L., 368, Artificial stone.
Law, J., 71, Carding-engines.
Law, S., 71, Carding-engines.
Laycock, T., 1078 (*App.* 39.) Sewing-machines.
Leach, G., 357, Preparing and carding wool; 358, Sea fishing; 359, Preparing wool.
Leatham, W., 30, Valves.
Lee, H., 2287 (*App.* 1.) Reaping and mowing.
Lee, J. H., 594 (*App.* 34.) Steam-boilers and engines.
Lee, R. B., 190, Metal telegraph posts.
Leech, W., 2567 (*App.* 5.) Preserving wood from the ravages of insects.
Leeming, T., 46, Bronzing and coloring paper, &c.
Leigh, J. S., 15, Aerial tramways.
Leon, W. F., 2057 (*App.* 50.) Hydraulic hoists.
Levy, G. S., 433, Lining straw board, &c.
Lewis, H., 322, Boots and shoes.
Lloyd, R., 2311 (*App.* 1.) Distilling turpentine.
Loddell, G. G., 2061 (*App.* 50.) Casting metals.
Lodighin, A. N., 91, Electrical heat.

Griffith, J., 2170 (*App. 52.*) Steam-boilers.
 Grigg, W., 786 (*App. 36.*) Applying electricity to cattle.
 Grindrod, J. T., 391, Raising and floating vessels, &c.
 Griswold, L., 2176 (*App. 52.*) Sewing-machines.
 Grout, W. H. J., 463, Carriage wheels.
 Groud, W. L., 465, Combination tool.
 Guattari, A., 453, Pneumatic telegraphs.
 Guernsey, J. W., 1352 (*App. 42.*) Shearing animals.
 Guerriero, A., *Comte de St. Ange*, 2184 (*App. 52.*) Horse-shoes.
 Gumpel, C. G., 9, Lowering ships' boats.
 Gutensohn, A., 258, Obtaining salt of tin and products from waste or refuse tin plate.

H.

Haas, B., jun., 2231 (*App. 52.*) Dial indicators for carriages.
 Hadfield, R., 1787 (*App. 46.*) Wheels, axles, shafts.
 Hadwen, J. W., 417, Mordanting, dyeing and printing; 470, Spinning.
 Haggett, W., 1461 (*App. 43.*) Metals.
 Haight, H. J., 966 (*App. 38.*) Artists' scrapers.
 Hale, E., 264, Rolling metals.
 Haley, S., 323, Treating hides and skins.
 Haley, S. H., 323, Treating hides and skins.
 Halfpenny, G. W., 262, Ink, incombustible paper, envelopes and books.
 Hall, J. H., 26, Grinding corn.
 Hambruch, G., 416, Railway carriages.
 Hamilton, E. C., 187, Manure.
 Hamilton, J. B., 387, Organ reed pipes.
 Hampton, T., 842 (*App. 37.*) Armour plates.
 Hannart, L., 397, Ticketing shop goods, &c.
 Harding, G. E., 2064 (*App. 50.*) Furnaces.
 Harmer, T., 335, Cleaning glass roofs.
 Harris, W. R., 419, Shuttle tops.
 Harrison, B., 32, Mechanical motive-power.
 Harrison, C., 121, Umbrellas, parasols and sun-shades.
 Harrison, C. W., 1, Air-gas; 435, Air-gas.
 Hart, G. W., 315, Steam-boilers.
 Hartley, R., 81, Singeing yarn.
 Hartsuff, J. H., 2649 (*App. 6.*) Steam pumps.
 Harwood, I. K., 967 (*App. 38.*) Pumps.
 Haseltine, G., 13, cart saddles; 77, Hospital beds; 126, Projectiles; 128, Rolling metals; 213, White lead; 233, Washers; 259, Dressing mill-stones; 303, Hinges; 326, Converting cast iron into steel; 351 Torpedo launchers; 459 Hoes; 681 (*App. 35.*) Economizing fuel; 806 (*App. 36.*) Lamps; 932 (*App. 37.*) Casting metals; 967 (*App. 38.*) Pumps; 1250 (*App. 40.*) Elevating apparatus; 1352 (*App. 42.*) Shearing animals; 1517 (*App. 44.*) Railway carriage-couplings; 1622 (*App. 45.*) Paper bags; 1641 (*App. 45.*) Separating liquids and substances; 2064 (*App. 50.*) Furnaces; 2212 (*App. 52.*) Sewing-machines; 2255 (*App. 1.*) Valves; 2257 (*App. 1.*) Inhaling apparatus; 2270 (*App. 1.*) Railway watering columns; 2284 (*App. 1.*) Weaving; 2287 (*App. 1.*) Reaping and mowing; 2311 (*App. 1.*) Distilling turpentine; 2353 (*App. 2.*) Tanning; 2354 (*App. 2.*) Rotary engines; 2600 (*App. 5.*) Preparing and packing water colors.

Hatfull, R., 281, Preventing and removing incrustation in steam-boilers.
 Hawkins, J. G., 220, Gas.
 Haycock, S. H., 126, Projectiles.
 Hayek, —, 310, Artificial stone.
 Hays, J. J., 437, Centrifugal hydro-extracting apparatus.
 Hays, W. B., 437, Centrifugal hydro-extracting apparatus.
 Hayward, W. F., 2050 (*App. 6.*) Iron safes and fastenings.
 Heaton, R. G., 388, Fishing reels.
 Hedges, K. W., 436, Steam-boilers and engines.
 Hemingway, J., 297, Railway keys and wedges.
 Henderson, A. C., 1644 (*App. 45.*) Hydro-caloric motors; 1645 (*App. 4.*) Fettling furnaces.
 Henley, T. F., 212, Meat extract.
 Henley, W. T., 254, Puddling furnaces.
 Henry, M., 33, Water gauges.
 Henson, H. H., 191, Shaping and punching iron.
 Herrick, S. K., 2185 (*App. 52.*) Sewing-machines.
 Hersey, C. H., 1233 (*App. 40.*) Granulators.
 Hersey, F. C., 1233 (*App. 40.*) Granulators.
 Hewett, S. B., 1793 (*App. 46.*) Fire-places.
 Heyne, J. F. C., 425, Kilns.
 Heyworth, E., 1890 (*App. 48.*) Steam-boilers.
 Hidden, T. B., 2600 (*App. 5.*) Preparing and packing water colors.
 Highton, H., 85, Electric telegraphs.
 Hill, J., 583 (*App. 6.*) Stove grates.
 Hillmann, J. H., 90, Puddling furnaces.
 Hindley, G., 178, Dressing stone.
 Hinds, E. C., 282, Preventing accidents on railway platforms.
 Hipkins, E., 165, Iron safes.
 Hitchcock, R., 356, Lamps.
 Hodges, S. H., 1380 (*App. 42.*) Boots and shoes.
 Hodson, H. F., 93, Agricultural and horticultural implements.
 Holding, J., 419, Shuttle tips.
 Hollingworth, J., 1464 (*App. 43.*) Weaving.
 Holman, S., 115, Gas retort mouthpieces, lids and fasteners; 136, Raising and lowering gas purifier lids, &c.
 Holmes, J. E., 98, Centrifugal machines and kilns.
 Hookham, G., 240, Metallic box fastenings.
 Hookham, H. J., jun., 240, Metallic box fastenings.
 Hopkinson, J. T., 181, window fasteners.
 Horner, G., 188, Spinning.
 Horsley, T., jun., 204, Closing cartridge cases.
 Hosking, J., 343, Safety valves.
 Howard, E. I., 2255 (*App. 1.*) Valves.
 Howe, W. H. I., 1428 (*App. 4.*) Fruit preserving cans, &c.
 Howlett, E. J., 1622 (*App. 45.*) Paper bags.
 Huch, E. H., 288, Soup farina.
 Hugall, C. E., 177, Window fasteners.
 Hughes, E. T., 63, Towing canal boats; 321, Combinations of textile threads.
 Hughes, P., 96, Dishes and plates.
 Hunt, B., 40, Printing telegraphs; 425, Kilns.
 Hunt, S., 142, Building blocks.
 Hunter, C. D., 2257 (*App. 1.*) Inhaling apparatus.
 Huntington, F. A., 1753 (*App. 46.*) Steam boilers and furnaces.
 Hutchings, A. J. H., 588 (*App. 3.*) Pickling.
 Hutchinson, J., 1464 (*App. 43.*) Weaving.
 Huxtable, J., 363, Turn-wrest ploughs.

I.

Ibbetson, J., 378, Leather.
Imray, J., 309 Steam-boilers; 325, Heating, evaporating, distilling, &c.
Intyre, P. Mc, 424, Sharpening chisels, &c.
Ireland, W., 263, Wheel tyres.

J.

Jackson, W., 338, Heating feed water.
Jacobsen, F., 266, Manure.
James, J. H., 456, Ornamenting fabrics.
Janney, E. H., 1517 (*App. 44.*) Railway carriage-couplings.
Jarman, H., 164, Steering ships.
Jasper, C. E. F., 407, Cigars.
Jaynor, A., 66, Steering and hoisting.
Jelley, R. S. C., 271, Cutting tenons.
Jensen, P., 149, Printing telegraphs; 2650 (*App. 6.*) Railroad rails.
Jewitt, H., 55, Toys.
John, W. H. St., 2527 (*App. 4.*) Purifying gas.
Johnson, A. F., 371, Fire alarm and water supply apparatus.
Johnson, J. H., 18, Spinning; 43, Transmitting power; 155, Fire-arms; 247, Signals; 305, Manure; 319, Self-setting animal traps; 356, Lamps; 405, Liquid fuel; 406, Tin foil; 443, Combined pencil and eraser; 521 (*App. 6.*) Automatic regulating valves; 522 (*App. 6.*) Lawn mowers; 1234 (*App. 40.*) Steam-engines; 1947 (*App. 48.*) Speed indicators; 2061 (*App. 50.*) Casting metals.
Johnson, J. O., 2342 (*App. 2.*) Fluid meters.
Johnston, J. B., 2650 (*App. 6.*) Railroad rails.
Jones, D., 372, Forcing inflammable fluid and liquid into furnaces.
Jones, E., 386, Cartridges.
Jones, F. L., 298, Weaving.
Jones, H., 187, Manure.
Jones, J. S., 283, Basting meat.
Jones, R., 451, Safety lamps.
Jones, R. C., 271, Cutting tenons.
Jones, S. B., 261, Railway carriages and platforms.
Jones, W., 118, Valves.
Joseph, J., 440, Brooches and bouquet holders
Joslin, W., 341, Furnaces.

K.

Kalmar, A., 5, Compasses.
Kay, T. B., 379, Carding engines.
Kercado, G. T. de, 104, Water meters.
Kesterton, H., 53, Rolling metals; 54, Metal telegraph posts; 253 Steam-boilers.
Kidd, J., 520 (*App. 6.*) Heating steam-boilers.
King, J., 467, Railway platforms; 468, Repairing propeller shafts at sea.
King, J. A., 116, Peat-fuel.
King, J. M., 467, Railway platforms; 468, Repairing propeller shafts at sea.

King, T. D. M., 467, Railway platforms; 468, Repairing propeller shafts at sea.
Kininmonth, J., 102, Bakers' ovens.
Kirkham, G. B., 444, Treadle motions.
Kirkman, J., 200, Governors.
Kitson, J. L., 521 (*App. 6.*) Automatic regulating valves.
Knevet, A., 438, Fire-grates.
Knight, E., 806 (*App. 36.*) Lamps.
Knight, J., 234, Umbrellas, parasols and sunshades.
Knowles, M., 105, Weaving.
Kolb, A., 316, Ventilating closets, &c.
Konn, S. W., 91, Electrical heat.
Krausse, H., 80, Air-gas.
Kreb, F., 1584 (*App. 44.*) Printing telegraphs.
Kux, A., 422, Steam-boilers.

L.

Laak, L. Van, 1062 (*App. 38.*) Bungs and bung inserters.
Labarre, E. de, 321, Combinations of textile threads.
Lacon, W. S., 186, Lowering ships' boats.
Lafargue, A., 458, Oil-gas.
Lake, W. R., 26, Grinding corn; 27, Cleaning horses; 79, Thread spools; 80, Air-gas; 127, Pipe-joints, elbows or couplings; 225, Fireproof vaults; 226, Fireproof safes; 227, Boots and shoes; 279, Railway breaks; 290, Refrigerating; 300, Clothes wringers; 317, Breakwaters; 371, Fire alarm and water supply apparatus; 396, Treating middlings; 441, Railway electrical breaks; 452, Valves; 454, Valves; 473, Heating steam-boilers; 558 (*App. 33.*) Drilling and boring; 1737 (*App. 46.*) Veneers; 1770 (*App. 1.*) Traction-engines.
Lamb, J. G., 340, Spinning.
Lamb, J. W., 73, Knitting machines.
Lancaster, R., 442, Gas regulators.
Lanier, G. P., 130, Mattresses.
Larmann, F. W., 2481 (*App. 4.*) Tuyeres.
Lartigue, H., 247, Signals.
Larue, J., 172, Printing.
Latham, B., 331, Manure.
Laurette, L., 368, Artificial stone.
Law, J., 71, Carding-engines.
Law, S., 71, Carding-engines.
Laycock, T., 1078 (*App. 39.*) Sewing-machines.
Leach, G., 357, Preparing and carding wool; 358, Sea fishing; 359, Preparing wool.
Leatham, W., 30, Valves.
Lee, H., 2287 (*App. 1.*) Reaping and mowing.
Lee, J. H., 594 (*App. 34.*) Steam-boilers and engines.
Lee, R. B., 190, Metal telegraph posts.
Leech, W., 2567 (*App. 5.*) Preserving wood from the ravages of insects.
Leeming, T., 46, Bronzing and coloring paper, &c.
Leigh, J. S., 15, Aërial tramways.
Leon, W. F., 2057 (*App. 50.*) Hydraulic hoists.
Levy, G. S., 433, Lining straw board, &c.
Lewis, H., 322, Boots and shoes.
Lloyd, R., 2311 (*App. 1.*) Distilling turpentine.
Lobdell, G. G., 2061 (*App. 50.*) Casting metals.
Lodighin, A. N., 91, Electrical heat.

Longworth, T., 298, Weaving.
Loo-Wauters, F. Van, 63, Towing canal boats.
 Loryea, A. M., 217, Hydraulic motive-power.
 Lowe, O., 36, Steam-boilers.
 Lowe, S., 73, Knitting machines.
 Lynde, F. G., 46, Bronzing and coloring paper, &c.
 Lyne, T., 380, Moulding bricks.
 Lyon, R., 523 (*App. 6.*) Railway communicating apparatus.
 Lyttle, W. A., 52, Roofs, floors and pavements; 158, Railway chairs.

M.

McCarty, B. F., 681 (*App. 35.*) Economizing fuel.
 McClean, F., 41, Raising ships.
 McClure, W. B., 13, Cart-saddles.
 McDougall, J., 393, Manure.
 McIntyre, P., 424, Sharpening chisels, &c.
 McWilliams, A. S., 2005 (*App. 49.*) Sheep shears.
 Macaulay, H., 92, Fire-arms.
 Mackie, S. J., 445, Explosive compounds.
 Macneill, Sir J., 206, Tramways and carriages.
 Macneill, R., 184, Pavements.
 Maitre, E., 2010 (*App. 49.*) Covering surfaces with wood.
 Malpas, W., 2567 (*App. 5.*) Preserving wood from the ravages of insects.
 Mamelzer, T., 397, Ticketing shop goods, &c.
 Manbré, A., 2, Valves.
 Maquay, S. W., 450, Gas retorts.
 Marchand, I. F. B., 375, Blocking boots.
 Markham, R. J., 345, Wheels.
 Marquez, P., 317, Breakwaters.
 Martin, B. G., 486 (*App. 33.*) Presses; 1148 (*App. 39.*) Presses.
 Martin, C., 174, Spinning.
 Martin, S. B., 290, Refrigerating.
 Marval, H. C., 398, Fire-arms; 413, Fire-arms.
 Mason, F. H., 681 (*App. 35.*) Economizing fuel.
 Masourine, M. S., 207, Caissons.
 Masson, J. B. F., 406, Tin foil.
 Mathelin, P. L., 409, Water meter and other cocks.
 Matthews, C., 264, Rolling metals.
 Matthews, W. J., 138, Fire-arms.
 Mayers, H., 2057 (*App. 50.*) Hydraulic hoists.
 Meakin, G. F. L., 1179 (*App. 49.*) Hanging sashes and shutters.
 Mellor, W. W., 132, Cutting glass.
 Metge, E., 710 (*App. 6.*) Preserving meat.
 Mewburn, J. C., 409, Water meter and other cocks; 410, Lubricating.
 Meylert, A. P., 213, White lead.
 Michaud, P. F., 629 (*App. 34.*) Axle-boxes.
 Michelet, J. C., 403, Converting a slow alternate circular motion into a rapid continuous motion.
 Mickle, W., 803 (*App. 36.*) Smelting and puddling iron; 921 (*App. 37.*) Economizing fuel; 1656 (*App. 45.*) Economizing fuel.
 Middlehurst, James, 346, Potato and other root gatherers, &c.
 Middlehurst, John, 346, Potato and other root gatherers, &c.
 Middlemass, J., 306, Clerical costumes.

Milburn, J., 483 (*App. 4.*) Chimney cowl.
 Miller, S. H., 19, Dies.
 Mills, B. J. B., 431, Screw propellers.
 Mills, F., 379, Carding engines.
 Mills, J. H., 1924 (*App. 48.*) Steam-boilers and engines.
 Mills, J. L., 123, Printing.
 Milner, E., 196, Lubricating.
 Mirfield, M., 423, Combing fibres.
 Molyneux, E. L., 2600 (*App. 5.*) Preparing and packing water colors.
 Monkhouse, T. S., 123, Printing.
 Moody, C., 2023 (*App. 49.*) Locks.
 Morand, A., 411, Kilns.
 Morgan-Brown, W., 822 (*App. 36.*) Boots and shoes; 1233 (*App. 40.*) Granulators; 1901 (*App. 48.*) Hydraulic hose.
 Morris, E. R., 29, Chartometers.
 Morris, T. S., 394, Furniture casters.
 Motay, C. M. T. du, 328, Baryta.
 Muirhead, L. P., 244, Speed indicators.
 Murdoch, H. H., 360, Explosive compounds.
 Myers, A. G., 127, Pipe-joints, elbows or couplings.

N.

Nangle, W. C., 495 (*App. 6.*) Paints.
 Napier, J., 246, Excavating under water.
 Naylor, M., 167, Weaving.
 Needham, J., 31, Fire-arms and cartridges.
 Negley, J. S., 431, Screw propellers.
 Neil, W., 2067 (*App. 50.*) Distilling spirituous liquors.
 Neill, J., 377, Forming sugar into blocks.
 Newcomb, W., 967 (*App. 38.*) Pumps.
 Newell, L. D., 503 (*App. 3.*) Ships' berths and sofas.
 Newell, W., 514 (*App. 6.*) Ornamenting tin-plate articles.
 Newton, A. V., 20, Paper-ruling machines; 257 Steam vacuum pumps; 444, Treadle motions.
 Newton, W. E., 19, Dies; 28, Musical instruments; 89, Waterwheels; 90, Puddling furnaces; 256, Fire-arms; 340, Spinning.
 Nichols, F. W., 303, Hinges.
 Nichols, J., 215, Ventilating waterclosets, &c.
 Norman, J., 135, Clipping animals.

O.

O'Donoghue, J. D., 2420 (*App. 3.*) Tooth brushes.
O'Donoghue, W., 2420 (*App. 3.*) Tooth brushes.
 Oldknow, J., 24, Lace-making.
 Olds, P. F., 681 (*App. 35.*) Economizing fuel.
 Olley, G., 338, Heating feed water.
 Olsen, C. H. G., 149, Printing telegraphs.
 Onderdonk, J. P., 1622 (*App. 45.*) Paper bags.
 Osborn, S., 313, Forging metals.
 Osborne, D. T., 198, Self feeding air-tight stoves.
 Osborne, J. W., 1947 (*App. 48.*) Speed indicators.
 Owen, J., 160, Mine shafts and hoists.
 Owen, W., 583 (*App. 6.*) Stove grates.

P.

H., 193, Breakwaters, docks, piers, &c.
 W., 107, Cutting screws.
 A., 5, Compasses.
 G., 405, Liquid fuel.
 F. A., 2618 (*App. 6.*) Electro-magnetic
 .., 198, Self feeding air-tight stoves.
 iodes, C. E., 173, Illuminating clocks,
 signs, &c.
 .., 396, Treating middlings.
 T., 25, Cabs and other vehicles; 144,
 for carriages.
 F., 469, Life rafts.
 A., 295, Clocks.
 E. G., 522 (*App. 6.*) Lawn mowers.
 J., jun., 365, Steam traps.
 .., 569 (*App. 5.*) Gas, fuel, oil, &c.
 R. H., 274, Purifying coal gas.
 G., 364, Chain cables.
 18, Spinning.
 W., 121, Umbrellas, parasols and sun-
 .. B., 7, Gas regulators.
 P., 109, Condensing liquefiable matters.
 C., 563 (*App. 34.*) Filters.
 H., 128, Rolling metals.
 H., 194, Metallic boxes.
 C., 1394 (*App. 42.*) Ships' logs.
 .., 395, Ventilating mines, buildings, drains,
 &c.
 F., 11, Smelling bottles.
 43, Transmitting power.
 263, Wheel tyres.
 .., 481 (*App. 6.*) Lowering and raising ships'
 N., 146, Craping hair, &c.
 73, Leather.
 284, Fire-arms.
 389, Ornamenting gas fittings, &c.
 156, Fire-places.
 J. M., 180, Lamps.
 N., 2270 (*App. 1.*) Railway watering
 s.
 E., 4, Salt.
 L., 1641 (*App. 45.*) Separating liquids and
 ces.
 .., 201, Weaving.
 .., 224, Barometers.
 T., 340, Spinning.
 L., 152, Umbrellas.
 O., 420, Extracting impurities from wool.
 T. C., 150, Steering ships.
 H., 153, Railway signals.
 W. R., 187, Manure.
 .., 446, Packing tobacco, &c.; 461, Dis-
 ing color upon continuous lengths of paper,
 C., 594 (*App. 34.*) Steam-boilers and
 .., G., 106, Metal tubes and bars.
 M., 564 (*App. 34.*) Nets.
 S., 366, Axles and axle boxes.
 J., 245, Aërial trainways.
 .., 233, Washers.

Q.

Quelch, W. B., 141, Heating and ventilating build-
 ings.
 Quimbel, G., 309, Steam-boilers.
 Quintavalle, R., 150, Steering ships.

R.

Rainbow, W., 297, Railway keys and wedges.
 Randolph, A., 470, Spinning.
 Rawle, G., 14, Tanning.
 Ray, R., 46, Bronzing and coloring paper, &c.
 Reynolds, C. T., 2600 (*App. 5.*) Preparing and pack-
 ing water colors.
 Reckendorfer, J., 443, Combined pencil and eraser.
 Redgrave, J., 223, Glass vessels.
 Reed, J. H., 1052 (*App. 38.*) Pegging boots and
 shoes.
 Rhodes, C. E. P., 173, Illuminating clocks, names,
 signs, &c.
 Rhodes, J. H., 382, Liqueur stands.
 Rich, A., 2600 (*App. 5.*) Preparing and packing
 water colors.
 Richardson, J., 370, Furnaces.
 Richardson, L., 2600 (*App. 5.*) Preparing and pack-
 ing water colors.
 Riley, E., 254, Puddling furnaces.
 Rippin, E. C., 2108 (*App. 51.*) Signals.
 Ritchell, C. F., 558 (*App. 33.*) Drilling and boring.
 Roberts, L., 94, Railway rails.
 Robertson, James, 448, Motive-power and blowing
 engines.
 Robertson, John, 248, Forcing, exhausting and mea-
 suring air, gas, &c.
 Robey, J., 230, Purifying, disinfecting and deodoris-
 ing.
 Robinson, W., 67, Signals.
 Roddis, J., 460, Chimney cowls.
 Rogé, H. N., 237, Railway switches and points.
 Rogers, H., 129, Carriages.
 Rogers, S. A., 190, Metal telegraph posts.
 Rolin, E., 605 (*App. 5.*) Weighing machines.
 Rosa, W. V. V., 356, Lamps.
 Rose, H. C., 255, Horse shoes.
 Rose, W. W., 55, Toys.
 Rosenfield, A., 2057 (*App. 50.*) Hydraulic hoists.
 Ross, J., 2238 (*App. 52.*) Sewing boots and shoes.
 Ross, L. E., 2284 (*App. 1.*) Weaving.
 Roturier, J., 101, Turning the leaves of music
 books.
 Rowland, T. F., 1287 (*App. 41.*) Gas retorts.
 Roy, J., 400, Umbrellas and parasols.
 Rutenberg, Baron V. de, 360, Explosive compounds.
 Rydill, G., 82, Drying-machines; 229, Dyeing,
 staining and drying animal and vegetable sub-
 stances, &c.; 329, Steam-boilers, furnaces, mo-
 tive-power, &c.; 376, Economizing fuel, heating
 feed water, &c.
 Rylands, J., 817 (*App. 4.*) Straightening, measuring
 and cutting wire and metal rods.
 Ryle, J., jun., 2332 (*App. 2.*) Refrigerators.

S.

Salleron, J., 509 (*App. 33.*) Corks.
 Salmon, P., 147, Gas, oil-gas engines and boilers.
 Samain, P., 1944 (*App. 48.*) Fire-arms.
 Sault, J., 2504 (*App. 4.*) Spreading silk.
 Sawyer, A. F., 217, Hydraulic motive-power.
 Sawyer, W. H., 1641 (*App. 45.*) Separating liquids and substances.
 Scheidecker, C., 661 (*App. 34.*) Shearing animals.
 Schenck, —, Bart., 310, Artificial stone.
 Schlesinger, W. J., 464, Stoning raisins; 465, Combination tool.
 Schmidt, H., 88, Marking timber, &c.
 Schoevers, A. T. C., 84, Trusses for hernia.
 Scholefield, R., 170, Brick making.
 Schwarz, L., 2218 (*App. 52.*) Economizing fuel.
 Schwarzenbach, V., 208, Gilding on glass.
 Scollay, G. W., 1815 (*App. 47.*) Preserving food.
 Scott, H. Y. D., 154, Treating sewage; 183, Purifying coal gas; 296, Manure.
 Scott, J., 423, Combing fibres.
 Scott, W., 138, Fire-arms.
 Sears, H. B., 349, Dressing stone.
 Seeling, H., 79, Thread spools.
 Seiferheld, A., 103, Boots and shoes.
 Seitz, C. D. J., 197, Paper making.
 Shanks, J., 199, Water supplying.
 Sharer, T., 238, Railway rolling stock.
 Sharp, J. P., 429, Steel.
 Shaw, J. (*Hull*), Heating.
 Shaw, J. (*Newcastle*), 597 (*App. 2.*) Punching and shearing.
 Shaw, W., 1298 (*App. 41.*) Printing.
 Shedd, D., 473, Heating steam-boilers; 2641 (*App. 6.*) Sewing-machines.
 Shedd, W., 1101 (*App. 39.*) Fibres.
 Sholl, C., 525 (*App. 1.*) Atmospheric hammers.
 Shuttleworth, J., 1078 (*App. 39.*) Sewing-machines.
 Sigourney, J. M., 356, Lamps.
 Silber, A. M., 334, Lighting and heating.
 Simon, H., 412, Tubular boilers.
 Sipriot, C., 479 (*App. 6.*) Exhibiting advertisements.
 Skinner, G., 394, Furniture casters.
 Small, J. H., 27, Cleaning horses.
 Smith, A. H., 23, Crushing stone, &c.
 Smith, D., 1079 (*App. 39.*) Railways.
 Smith, G., 70, Ventilating boots and shoes.
 Smith, H., 324, Infants' feeding bottles.
 Smith, H. J., 351, Torpedo launches.
 Smith, J. Y., 279, Railway breaks.
 Smith, S., 352, Indicating and checking number of passengers, amounts of fares, attendances of workmen, &c.
 Smith, T. J., 124, Steam-boilers; 328, Baryta.
 Smith, W. B., 133, Sewing machines.
 Snoeck, A., 321, Combinations of textile threads.
 Sokolnicki, J., 336, Lamps.
 Soul, M. A., 101, Turning the leaves of music books.
 Sowerbutts, A., 100, Raising ships.
 Spence, P., 50, Treating waste liquors in alum works.
 Sprague, W., 1770 (*App. 1.*) Traction-engines.
 St. Ange, Comte de, 2184 (*App. 52.*) Horse shoes.
 St. John, W. H., 2527 (*App. 4.*) Purifying gas.

Stacy, G., 2012 (*App. 49.*) Stone cutters.
 Starley, J., 133, Sewing machines.
 Stead, J., 249, Rotatory engines.
 Stead, T., 291, Washing and wringing machines.
 Stebins, T., 2057 (*App. 50.*) Hydraulic hoists.
 Steinhoff, G., 88, Marking timber, &c.
 Stell, S., 111, Consuming smoke and saving fuel.
 Stephens, L. A., 97, Bottles and corks.
 Stephens, W. B., 35, Paints.
 Sterling, W. H., 2022 (*App. 49.*) Preserving iron.
 Stevens, L., 216, Carbonic oxide.
 Stidder, J. G., 236, Water waste preventers.
 Stirling, J., 374, Railway breaks.
 Stone, T., 231, Carding engines.
 Strange, L., 381, Presses.
 Stroudley, W., 6, Casting metals.
 Stuart, D., 155, Fire-arms.
 Stuart, T. E., 2354 (*App. 2.*) Rotary engines.
 Sudlow, W. E., 272, Steam-engines.
 Sutcliffe, W., 148, Miners' safety lamps.
 Suzanne, P. A. L., 140, Imitation school slates, tablets, &c.

T.

Taft, J., 373, Preparing and cleaning cotton, &c.
 Talcott, C. Mc K., 414, Screws.
 Target, J. L. F., 168, Treating sewage.
 Tasker, H., 472, Hay and straw elevators.
 Taylor, J., 430, Charging and drawing retorts.
 Taylor, J. F., 1241, Presses.
 Tesseyman, J., 2255 (*App. 1.*) Valves.
 Tester, J., 299, Cutting vegetable substances.
 Theaker, H., 313, Forging metals.
 Thompson, W. G., 42, Extracting oleaginous matters.
 Thorneloe, J., 402, Organs and harmoniums.
 Thwaites, R., 97, Bottles and corks.
 Ticozzi and Co., 441, Railway electrical breaks.
 Tiffany, J. C., 798 (*App. 36.*) Oil-gas.
 Todd, R., 348, Weaving carpets.
 Tongue, J. G., 140, Imitation school slates, tablets, &c.
 Touaillon, C., 2184 (*App. 52.*) Horse-shoes.
 Toulson, J. A. H., 335, Cleaning glass roofs.
 Townsend, W. H., 2190 (*App. 52.*) Printing oil-cloths, &c.
 Trippe, F. J., 134, Cutting textile fabrics.
 Turner, G., 60, Venetian blinds.
 Turton, T., 169, Hydraulic propellers.
 Turton, W., 129, Carriages.
 Twynam, C. H., 285, Railway signals.

U.

Ulery, W. G., 1234 (*App. 40.*) Steam-engines.
 Ullmann, S., 112, Trousers and suspenders.
 Umbers, E., 56, Signals.
 Unsworth, T., 195, Doubling machines.

V.

Van Den Bergh, J., 8, Harness.
 Van Laak, L., 1062 (*App. 38.*) Bunges and bung inserters.

Wauters, F., 63, Towing canal boats.
 Weerssch, A. H., 155, Fire-arms.
 Whelan, E. P. H., 297, Railway keys and wedges;
App. 34.) Shearing animals; 2481 (*App. 4.*)
 Whelan, J., 289, Governors.
 White, F. N. C., 710 (*App. 6.*) Preserving meat.

W.

Wadsworth, H., 293, Miners' safety lamps.
 Wadsworth, A., jun., 58, Steam-boilers.
 Wadsworth, I., 77, Hospital beds.
 Wadsworth, J., 125, Double furrow ploughs.
 Wadsworth, W., 337, Rolling and drawing wire.
 Wadsworth, J. T. C., jun., 203, Fibres.
 Wadsworth, A. A. de, 304, Umbrella and parasol frames.
 Wadsworth, J. W., 225, Fireproof vaults; 226, Fire-
 safes.
 Wadsworth, A., 1572 (*App. 44.*) Piling textile fabrics.
 Wadsworth, A., 137, Combined thrashing machine and
 tor.
 Wadsworth, John, 275, Tramway points.
 Wadsworth, Joseph, 370, Furnaces.
 Wadsworth, J. W., 166, Spinning.
 Wadsworth, F. Van L., 63, Towing canal boats.
 Wadsworth, A. E., 728 (*App. 46.*) Candles and night-
 s.
 Wadsworth, J. H., 400, Umbrellas and parasols.
 Wadsworth, L., 1270 (*App. 41.*) Galvanic batteries.
 Wadsworth, C., 209, Fire lighters.
 Wadsworth, B., 2092 (*App. 50.*) Ship-building.
 Wadsworth, E. B., 40, Printing telegraphs.
 Wadsworth, E. J. C., 51, Safety valves.
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CHRONOLOGICAL AND DESCRIPTIVE INDEX
OF PATENTS APPLIED FOR AND PATENTS GRANTED,

CONTAINING THE

ABRIDGMENTS OF PROVISIONAL AND COMPLETE SPECIFICATIONS

Delivered from February 9 to February 15, 1873.

A.D. 1873, February 10.—No. 474.

ERDERMANN, RICHARD, of Princes Street, in the county of Surrey, civil engineer.—“An improved mode of reducing metals from their ores and purifying and refining the same.”
My said invention relates to an improved mode of applying electric currents in order to reduce metals directly from the ores with or without the ordinary chemical action of carbonaceous matter, and in purifying and refining at the same time and by the same process the metal during its reduction from the ore.

A.D. 1873, February 10.—No. 475.

AYLEY, CHARLES HENRY, of Bolton, in the county of Lancaster, cotton spinner, and CHEETHAM, BEN, of the same place, manager.—“Improvements in or applicable to machines for combing cotton, and other fibrous substances.”
It relates to means for stopping combing machines when one or more of the slivers from any of the combing heads of the machine breaks, and consists of an arrangement and combination of mechanism with the ordinary mechanism of the combing machine.
Each sliver passes over a separate lever “spoon” placed close to the back of the fluted roller of the drawing stand, and the “spoon” falls from the roller and arrests the motion of a vibrating bar when a “sliver” fails, and this acts upon a jointed connecting rod that lifts a latch, which allows a spring to traverse the driving belt on to the loose pulley.

A.D. 1873, February 10.—No. 476.

ERDERMANN, RICHARD, of Princes Street, in the county of Surrey, civil engineer.—“An improved mode of and apparatus for purifying and refining metals and alloys.”
My said invention consists in an improved mode of applying electric currents to remove the noxious elements mixed or combined with the metal or alloy, and to permit such noxious elements when required to be collected and purified; it also consists in improved apparatus whereby the currents are effectually employed.

A.D. 1873, February 10.—No. 477.

LICKS, ARTHUR THOMAS, of Alma Street, Kentish Town, in the county of Middlesex, architect.—“Improvements in securing a foothold on roads, footways, platforms, stairs, and other like surfaces.”
In order to secure a good foothold upon street pavement and roadways, I stud the surface with bosses of elastic composition, or I apply cushions of the same substance between the transverse joints of the material which form the wearing surface of the road or way.

A.D. 1873, February 10.—No. 478.

TORRY, ALFRED, of Bramley, near Leeds, in the county of York.—“Improvements in rivetting machines employed in the manufacture of boots and shoes.”
A vertical reciprocating motion is imparted to a sliding tool holder carrying the rivetting tools. Another slide carries a saddle fitted with a sliding table having a vertical sliding motion; the iron last has a traversing motion, and is carried by a carrier on the table; the rivets are fed one by one point downwards and under the rivetting tool, and driven into and through the soles and heels of boots and shoes and rivetted, whereby the soles and heels are secured to the uppers.

[No 7.] Price 4d.

A.D. 1873, February 10.—No. 479.

SIPRIOT, CASIMIR, of Milan, in the Kingdom of Italy, merchant.—“An improved apparatus for exhibiting placards, posting-bills, and other advertisements.”

The invention consists in a peculiar construction of apparatus for effecting a continuous or intermittent passage or travel of the placard or other advertisement before the eyes of persons passing by.

A.D. 1873, February 10.—No. 480.

PILLING, WILLIAM, of Salford, in the county of Lancaster, proprietor of Lowe's patent stench trap, and HARLOW, BENJAMIN, of Macclesfield, in the county of Chester, engineer.—“Improvements in the construction of stench traps and grids for street and other sewers or drains.”

The features of novelty in this invention consist in forming the cover or upper part of the water lute in those descriptions of stench traps now well known as “Lowe's Patent” at a lower level than the grid, and in the peculiar manner described in the Provisional Specification, by which means a “cleaner” casting is produced, and the whole of the upper surface of the framework is available for a grid or grating; and in constructing the mouth or outlet of the water lute with a socket, as and for the purposes described.

A.D. 1873, February 10.—No. 481.

PINKER, JOHN, of Liverpool, in the county of Lancaster.—“Improvements in lowering and raising ships' boats, and in the apparatus employed therefor.”

The features of novelty which constitute this invention consist in lowering and raising ships' boats clear of the ship's side by means of a novel construction of davit, which is hinged or jointed to the ship's side just above the water line. The davit passes underneath the boat, and bends over the boat inboard. The two davits carrying the boat are stayed or braced together, and are worked by a toothed quadrant and pinion, which is driven, regulated, and governed by an hydraulic or steam cylinder or cylinders. In connexion with the apparatus there is a pulley and tackle to enable the davits to be raised after the boat is lowered, or to raise the boat with the davits. This pulley and tackle may act conjointly with the hydraulic or steam cylinders, or independently.

A.D. 1873, February 10.—No. 482.

KENYON, JOHN HENRY, of Blackburn, in the county of Lancaster, TAYLOR, WILLIAM, of Oldham, in the same county, and KENYON, JAMES, of Blackburn, aforesaid, cotton spinners.—“Improvements in apparatus for economising steam for drying yarns and fabrics.”

“Our invention consists in drying yarns and fabrics by means of a coil or coils of pipes, both ends of which are in direct communication with the steam boiler.

Our invention is particularly applicable for drying yarn after it has been sized in the ordinary machines for sizing and dressing.

Our invention is also applicable for drying fabrics as well as yarns.

A.D. 1873, February 10.—No. 483.

MILBURN, JOSEPH, of Marlborough, in the county of Wilts, ironmonger.—“Improvements in chimney cowl.”

This invention relates to a peculiar noiseless revolving chimney cowl for curing smoky chimneys, and consists in enclosing the flint or other hard bearing surface which supports the spindle carrying the cowl in any good non conductor of sound, such for example as leather or preparations of india rubber.

The box containing the flint and non conductor of sound is rendered fire proof by having all its joints rivetted together.

This box is contained in the bottom of a copper oil box which is so elevated as to bring its lower end about level with the top of the chimney shaft, thus affording greater facility for sweeping the same.

This box is also made fire proof by being rivetted together, and is supported on angular brackets attached to the shaft, a non conductor of sound such as leather being interposed between the brackets and the shaft.

Within the oil box there is fitted a spindle box which rests upon a collar on the flint box and has openings in the top and bottom for the spindle to work in, other openings being provided for the passage of oil through both ends of the said spindle box. Collars of leather or other non conductors of sound are fixed to the top and bottom of the spindle box at the parts where it comes in contact with the spindle. Another collar is also fitted to the upper part of the spindle underneath the cap or cover of the oil box to prevent the

spindle from being accidentally lifted out of its place by the wind. The top of the spindle carries three arms radiating from the spindle, forming a species of framing to which the cowl head is secured in lieu of having only two arms straight across.

Radiating fans increasing in depth towards their outer ends are fixed onto the head of the cowl in lieu of being cut out of the same, so that in my cowl there are no openings in the head for the entrance of down draught. These fans are stayed by means of a ring of wire, and the louvres at the sides are similarly stayed both at the top and bottom ends.

A.D. 1873, February 10.—No. 484.

DAELEN, VITAL, of the New Steel Works, Bochum, province of Westphalia, Empire of Germany.—“Improvements in the manufacture of wheel tyres and other similar hoops or rings.”

This invention relates to the manufacture of weldless tyres or hoops out of a ring of cast steel or iron in such a manner that during the whole working or process the whole portion of a ring or tyre section, that is to say all the four sides of one section, are subjected to compression, and all particles or fibres of the material are equally compressed.

A.D. 1873, February 10.—No. 485.

YULL, GEORGE TAYLOR, of Neutra, Dominion of Hungary and Empire of Austria, also of 166, Fleet Street, in the city of London, civil engineer.—“Improvements in apparatus or appliances for clearing and removing snow, slush, and other debris from tramway tracks and grooves, and from roadways in general, also in appliances for facilitating the sanding of such tracks and roadways.”

This relates to apparatus whereby tramway tracks can be scraped, the grooves cleaned, the debris lifted, and the track sanded by a single vehicle before the first car starts upon its first journey in the morning. The tram can also be cleaned during the day with little delay to the constant traffic or passage of cars.

A.D. 1873, February 10.—No. 486.

BONNEVILLE, HENRI ADRIEN, of the British and Foreign Patent Offices, 6, Piccadilly, in the county of Middlesex, and 18, Rue de la Chaussée d'Antin, Paris, France, patent agent.—(*A communication from Benjamin Green Martin, a person resident at the city and state of New York, United States of America, manufacturer.*)—“Certain improvements in presses and in the means of ascertaining the power exerted by said presses.”

This invention consists of a press, the follower of which is actuated by travellers acting on two pair of toggle levers, and the press box of which is made in two semi-cylindrical sections, the rear section being hinged to the bed plate, so that it can be folded outward to facilitate the operation of removing the material subjected to the action of the press.

A.D. 1873, February 10.—No. 487.

WILSON, WILLIAM, of the town of Newcastle-upon-Tyne, hat manufacturer.—(*A communication from Rudolph Eickemeyer, of Yonkers, in the United States of America.*)—“Improvements in machinery for the manufacture of hats.”

According to this Provisional Specification—

- 1st. A carrying apron is combined with a hat former to support the web from the carding engine.
- 2nd. The cone of the hardening apparatus is made in parts or staves, and a uniform motion is communicated to each part.
- 3rd. To stretch hat bodies two pieces of wood vibrating to and from each other are employed.
- 4th. To shape bell crown hats a hat block made in two pieces hinged to a counterpiece and a spreading wedge is employed.
- 5th. A special lathe is used in sand papering hats.
- 6th. A special machine is used to give a tufted or petersham finish.

A.D. 1873, February 10.—No. 488.

KNAGGS, WALTER, of 5, Euston Grove, Euston Square, in the county of Middlesex.—“Improvements in fire places.”

This Provisional Specification describes a fire place with the grate set forward at a distance from the walls of the fire place and with reflectors placed between the grate and walls. The grate may be fed with solid fuel or heated by gas acting upon incombustible material. If solid fuel is used the fuel is fed upwards into the grate from a chamber below it. An arrangement for effecting this is described

A.D. 1873, February 10.—No. 489.

REYNOLDS, JOHN HAMMON, commercial traveller, and REYNOLDS, JOHN, surgeon, both of Somerleyton Road, Brixton, in the county of Surrey.—“Improved guiding apparatus for keeping railway engines “and carriages upon their rails.”

Our said invention consists in placing in or near the centre of each pair of the rails of a railway a safety guiding rail, and in providing the engines and carriages with wheels arranged in combination with the said guiding rail in such a manner as to prevent the escape of the said engines or carriages from their proper position on the rails, while offering no obstruction or impediment to their progress or movement thereon.

A.D. 1873, February 10.—No. 490.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from Paul Tesse, Henry Lartigue, and Pierre Désiré Prud'homme, all of Paris, France.*)—“Improvements in railway signalling apparatus.”

The electric apparatus is actuated by the working of the signal arms by a handle, in such manner that the apparatus will indicate both when a train enters upon and quits a block or section of the line, in addition, in the case of single lines, to showing whether the line is clear or blocked by a train travelling in the opposite direction.

A.D. 1873, February 10.—No. 491.

ROGERS, JOHN BANTING, of Hope Cottage, Robertsbridge, in the county of Sussex.—“Improvements in “rockets and similar signals, and in apparatus for propelling the same.”

The nature of this invention is to facilitate the utility of rockets & signals, and this under all conditions of weather, both on sea and land, either for war or peace purposes, by giving such projectiles that impetus necessary for directing and overcoming the inertia which now causes such missiles to be unreliable in aim and distance by the force wasted to give the first onward motion.

All this can be given by the gun and appliances devised as set forth in the annexed forms.

A.D. 1873, February 11.—No. 492.

CARDOZO, HERBERT GEORGE, of 2, Bath Place, Junction Road, Holloway, in the county of Middlesex.—“An improvement in the construction or manufacture of horses' shoes, to enable and ensure a horse's safe “and quick travelling in either frosty or slippery weather.”

This my invention has for its object the construction of horse shoes so made that in frosty or slippery weather there is no necessity for removeing or takeing off the said shoes to rough them, the said shoes haveing at the side or sides or wherever is preferable a projecture or projectures, in which is a hole for the insertion of a rough, which rough is secured by a nutt or other suitable appliance, the feature of novelty being the projecture on the shoe, as shown in the accompanying drawings.

A.D. 1873, February 11.—No. 493.

LEE, HENRY MICHAEL, of the city of London, decorative artist.—“An improved method of preserving “ferns, plants, and grasses, and the preparation of the material or materials and ingredients employed “therein.”

This invention relates to the preparation and preserving of ferns, arborvitae, lichens, mosses, grasses, and all kinds of British and foreign plants, as well as the numerous varieties of seaweed, in such a manner that the same will resist the action of light and heat for an indefinite period after collection, and represent them in their natural state or living form and appearance.

A.D. 1873, February 11.—No. 494.

BRIGGS, JAMES, cotton manufacturer, and WILLAN, ROBERT, and LEWIS, DOCTOR, machinists, all of Blackburn, in the county of Lancaster.—“Improvements in sizing or dressing machines.”

The improvements relate to the drying part of the machine, and consist of a number of large steam chests, placed upright or at an angle, at short distances apart, so that the yarn may pass up and down in the spaces between them; the yarn also passes over the top and under the bottom of them, and is carried by carrier rollers. We dispense with the fan used in ordinary machines, and substitute a much smaller and covered fan or two if required, and guide the air in tubes to the spaces between the steam chests, where it is dispensed in jets, the tubes being perforated at those places for the purpose. The fan we can place and drive

independently of the machine or not; if independently, we use a valve in the air tubing, which is shut at each stoppage of the machine. We warm the air supplied to the fan by causing it to traverse a tube in which we place a steam pipe. For some kinds of yarn we dispense with the fan altogether. To thoroughly dry the edges of the warp, we place special steam pipes just under the edges, where they pass longitudinally under and over the steam chests, and we make these pipes movable, so as to be adjustable to different widths of warps. The radiating surfaces of the steam chests we make of tinned iron, and the ends of cast iron, the ends being stayed to each other by one or more stays, and the tinned portion by angle or T iron stays fastened to the tinned part by a bolt. The chests are coupled up with the necessary piping, and have each an inlet for steam and an outlet for water. The sides of the machine are made blank and furnished with doors.

A.D. 1873, February 11.—No. 495.

NANGLE, WALTER CHIDIOCK, of Bull Point, near Devonport, in the county of Devon, late Captain Royal Artillery, now Assistant Controller, Bull Point Establishment.—“A new or improved composition or paint to be used for coating metal and other substances.”

This composition or paint is composed of coal tar, rosin, plaster of paris, dry red lead, spanish brown, and benzoline.

The rosin is first dissolved by heat, then mixed with the plaster of paris; to these are added some tar, red lead, and spanish brown, and when well mixed the remainder of the tar and other ingredients are added, and the whole boiled. When cold the benzoline is added.

This paint is particularly recommended for preserving iron, but may also be applied with advantage as a coating for other metals and substances.

A.D. 1873, February 11.—No. 496.

STONE, JAMES, of Kirby Street, Hatton Garden, in the county of Middlesex.—“Improvements in the construction and arrangement of flues for furnaces.”

The shaft of the flue, whether placed vertically or horizontally or at any angle is continued beyond the crown or wall of the furnace into the space above the fuel, the result being that the smoke and products of combustion which rise from the incandescent fuel towards the upper part of the furnace are deflected downwards by the projecting shaft of the flue instead of at once entering the same and escaping to the external atmosphere, and are brought into contact with or efficiently exposed to the heat of the burning fuel. By these means those portions of the smoke or other products of combustion are effectually consumed and utilised.

A.D. 1873, February 11.—No. 497.

FISKEN, DAVID, of Stamfordham, in the county of Northumberland, gentleman.—“Improvements in rope porters for steam ploughing machinery.”

That part of the porter placed in the ground I form of steel prongs sharpened at the lower end which I secure to a stake or extend upwards, so as to form part of brackets which hold the pulley stud upon which the pulley is mounted loosely. In the former case the brackets are secured to the upper part of the stake, but in either case they are carried up above the pulley, and their ends turned inwards and aslant so as to prevent the rope running off the pulley when the pulley is in a line with the latter, but so as to allow of the rope being immediately removed by simply turning the porter slightly.

A.D. 1873, February 11.—No. 498.

GASCOYNE, WILLIAM, of Leamington, in the county of Warwick, builder.—“Improvements in the manufacture of D-traps for water closets and other like purposes.”

This Provisional Specification describes the making of D traps in one piece of metal without the use of solder.

A.D. 1873, February 11.—No. 499.

CHANTRELL, GEORGE FREDERICK, of Liverpool, in the county of Lancaster, sanitary engineer.—“Improvements in and apparatus for storing, cleansing, and facilitating the removal of ‘house refuse’ and ‘fecal matter.’”

The features of novelty in this invention consist in the novel construction and disposal of a suitably shaped receptacle and casing for containing the ashes and other solid matter from dwelling houses, whereby such refuse is kept dry and facility is afforded for removing it by the proper authorities; and in a modification of the same receptacle for containing charcoal for receiving and cleansing house slops, and for use in privies to separate the solid foecal matter and permit the liquid portion only to escape into the drain pipe.

A.D. 1873, February 11.—No. 500.

COWAN, JOHN, of Dromore, Kenmare, in the county of Kerry, Ireland.—“Improvements in apparatus for heating green-houses and horticultural and other buildings.”

According to this Provisional Specification, a water boiler is placed at the top of a lime kiln, and pipes leading from the boiler circulate the water in the building to be heated.

A.D. 1873, February 11.—No. 501.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from Charles Rhodes Goodwin, of Paris, France.*)—“Improvements in sewing machines.”

This invention consists more particularly in the application to hand machines having two longitudinal shafts, of a horizontally working shuttle, such as that of machines used for sewing boot elastics.

The desired alternate circular motion is imparted to the shuttle by an eccentric on the lower feed shaft (operated from the upper needle shaft) the eccentric rod being connected with an oscillating lever which imparts to and fro motion to a transverse rack in gear with a pinion on the spindle of the shuttle driver.

A.D. 1873, February 11.—No. 502.

DEBENHAM, ARTHUR, of Regent's Park Road, in the county of Middlesex, farmer.—“Improvements in undershirts, and in flannel and other waistcoats.”

The invention consists in applying to the upper part of the inner surface of undershirts or flannel waistcoats a partial lining of chamois or other soft washing leather, the same being pierced with holes at say about one inch apart to permit of perspiration passing through it.

A.D. 1873, February 11.—No. 503.

NEWELL, LORENZO DOW, of the “Castle & Falcon,” Aldersgate Street, in the city of London.—“Improvements in ships' berths and sofas.”

A movable oscillating berth pivotted at the sides and ends on a frame—this is fixed or mounted on slides for adjustment, and can be pushed close to the wall of the cabin when not required to oscillate, and so allow of extra room. There is an adjustable balance weight and apparatus to enable the occupant to maintain the centre of gravity. Also a rod with an extending and shortening movement for securing the berth when it is about to be entered.

The sofas are generally on the same principle but pivotted at the ends only, the back being movable to form a top if required.

A.D. 1873, February 11.—No. 504.

NORRIS, JOHN, of Birmingham, in the county of Warwick, manufacturer.—“Improvements in the manufacture and construction of mathematical drawing instruments.”

This invention consists in manufacturing compasses, bow pens, bow pencils, and straight pens, and the loose parts of compasses of malleable or annealed cast iron or cast steel, each leg or part of the instrument being cast in one piece in sand or other moulds. The point ends of the cast legs or other parts are case-hardened, or steel points are put in the moulds and fixed by the casting process.

The parts of the instruments so made are next polished and their surface coated with an electro-deposit of brass or german silver, to prevent oxidation. The jointed parts of the instruments are connected together in the ordinary way.

The loose leg and other loose parts are secured to the short leg of the compass by screwing the loose leg or part into the socket of the said short leg, instead of using a detachable screw for fixing the loose leg or part to the compass as usual.

A.D. 1873, February 11.—No. 505.

DEACON, HENRY, of Appleton House, Widnes, in the county of Lancaster, alkali manufacturer.—“Improvements in the manufacture of chlorine.”

This invention relates to improvements upon Deacon's chlorine process, and consists in mixing the active substance or substances employed with one or more substances of another class which when used alone are inactive or inert, that is, do not possess the power of decomposing heated hydrochloric acid gas and air or oxygen in any material degree, but when mixed with the sulphate of copper, *ceteris paribus*, materially increase its activity in this respect. Sulphate of soda and sulphate of potash are types of this class of inactive but so to say accelerating substances.

A.D. 1873, February 11.—No. 506.

BASH, SAMUEL, of Paisley, in the county of Renfrew, North Britain.—“Improvements in bobbins.”

The feature of novelty which constitutes this invention is the construction of the ends of paper bobbins in one piece, so shaped that they fit on or into the tubular body or barrel.

A.D. 1873, February 11.—No. 507.

GILCHRIST, WILLIAM, of the firm of Gilchrist and Goldie, brickmakers, of Glasgow, in the county of Lanark, North Britain, and THOMAS, MOSES, in the employment of the said firm.—“Improvements in the manufacture of bricks, tiles, and other similar articles, and in the machinery or apparatus employed therefor.”

The features of novelty which constitute this invention are, the employment of reciprocating boxes in conjunction with an ordinary pug-mill for moulding bricks, tiles, and other similar articles; the use of steam to disengage the bricks from the moulds; and the use of a “kicker” to remove the bricks from the apparatus.

A.D. 1873, February 11.—No. 508.

SIDDONS, WILLIAM TURTON, of Hill Top, West Bromwich, in the county of Stafford, charcoal manufacturer.—“An improved apparatus for preventing the overwinding of skips in the shafts of mines.”

This invention consists in the construction of an improved self-acting apparatus connected to and worked by the engine employed for raising skips in the shafts of mines, whereby when the skip reaches the point to which it is to be raised steam is automatically shut off from the engine and the brake applied, thus preventing the overwinding of the skip.

A.D. 1873, February 11.—No. 509.

SALLERON, JULES, of No. 24, Rue Pavée, Paris, in the Republic of France, cork manufacturer.—“Improvements in the manufacture of corks, and in the apparatus employed therein.”

The invention consists,—

First. In testing the cork by submitting it to a pressure of 6 to 7 atmospheres in presence of pure or alcoholised water in which cork of bad quality becomes spotted and black; the soft parts of the corks hollow out and the cork itself assumes an oval form and loses its form if the cork is of bad quality.

Secondly. In forming the corks of pieces of thin cork of good quality grouped together so that the front of the bark shall form the circumference of the cork, and the hard veins in supporting each other form a cork of equal elasticity throughout its diameter and very strong; and in attaching these pieces together by means of a solution of dry india rubber before being pressed together, partly in cementing a disk of cork for the head of the cork.

Thirdly, in forming the corks of two pieces of cork back to back with a cement of india rubber so as to leave the front outside.

Fourthly, in covering the corks of an inferior quality with a sheet cut from cork of good quality parallel to the hard layers of the back.

A.D. 1873, February 12.—No. 510.

LAWRENCE, FREDERIC LOUIS, of Tavistock Square, in the county of Middlesex.—(*A communication from Charles Lawrence, of New York, in the United States of America.*)—“A new or improved apparatus to be used in boilers for washing or cleansing clothes, and similar purposes.”

This apparatus consists of an upright tube rising from the centre of a hollow stand or support, within which are a series of spiral scrolls or divisions, all leading from the side of the stand to a central aperture

opening into the upright tube. The stand is open at the bottom, and so made that when placed on a flat surface, apertures may be left for entrance of water or steam by the bottom.

When the apparatus is placed in a boiler the stand rests on the bottom, the upright tube rising nearly to the top; the clothes, previously well soaped, are then put into the boiler, together with pieces of soap, and warm or cold water poured in until the boiler is about three fourths filled, the cover is then put on, and when the water boils steam issues from the mouth of the upright tube, keeping the clothes in constant agitation, and driving a continuous stream of suds and steam through them until they are thoroughly cleansed.

The apparatus is made of any metal or material which will not be affected by the lye used or injure the clothes or other matters to be washed or cleansed.

A.D. 1873, February 12.—No. 511.

MAQUAY, SAMUEL WILLIAM, of Charlemont Terrace, in the city of Dublin, Ireland.—“An improved process to be employed in the manufacture of manures, and machinery or apparatus therefor.”

This invention consists in manufacturing manures from coprolites or similar substances by the continuous application and employment of acid and other gases within closed vessels in connection with endless elevators and revolving stirrers.

A.D. 1873, February 12.—No. 512.

MYERS, SAUL, of No. 1, Vale Terrace, Maida Vale, in the county of Middlesex, gentleman.—“An improved stove or grate for the purpose of saving coal and other fuel and generating a greater amount of heat than can be obtained from stoves and grates now in use.”

These stoves and grates are so constructed that by an arrangement of reflectors, whether the fuel used be coal, coke, wood, peat, gas, or any other materials producing heat, or a combination of any two or more of them, the heat rays are radiated and thrown outwards, and are thus utilized instead of ascending and passing off with the smoke and draught.

A.D. 1873, February 12.—No. 513.

CAMPBELL, HUGH, physician, of 38, Queen Anne Street, Cavendish Square, in the county of Middlesex.—“Improvements in the manufacture of manure and apparatus therefor.”

To saturate absorbent and nitrogenous substances with solutions and liquids containing ammoniacal salts, ammonia, or its chemical elements, and afterwards to reduce the combinations so obtained to powder, so as to facilitate their rapid, cheap, and easy distribution over land.

A.D. 1873, February 12.—No. 514.

NEWELL, WILLIAM, of Birmingham, in the county of Warwick, manufacturer.—“Improvements in ornamenting certain articles or parts of articles made of tin plate, and in apparatus to be used for that purpose.”

This invention consists in ornamenting the bodies, lids, and feet of tea pots and other vessels, plate covers, waiters, and other articles or parts of articles made of tin plate in the following manner.

The body or part of the article to be ornamented is placed in a concave or hollow steel die having the general figure of the article to be ornamented. The said die being engraved or sunk internally with the required design or ornament. A rotatory motion being given to the die and the article within it by means of a lathe or other machine, a pressing or burnishing tool is pressed with great force against the rotating body and the metal of the said body is pressed against the interior of the ornamented die and thereby made to receive, or is impressed with, the design or ornament on the die. In this way various articles, or parts of articles, of tin plate may be ornamented.

A.D. 1873, February 12.—No. 515.

BROAD, JOHN, of Hornsey Rise, Islington, in the county of Middlesex, chemist.—“An improved case or bag for applying poultices and other external applications to various parts of the human body.”

This case or bag is composed of a waterproof cloth back (or other material similar) and a muslin, lawn, or other like fabric in the front, the poultice being introduced between.

It prevents leakage and evaporation, and is expeditious and cleanly in application.

A.D. 1873, February 12.—No. 516.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws.—(*A communication from James Mapes Dodge, of Newark, New Jersey, United States of America.*)—"Improvements in apparatus for adjusting the screw-propellers and rudders of canal-boats and other vessels."

The said improvements relate to the propulsion of boats in canals, or other shoal water navigation. The said invention consists in suspending the screw shaft in a tube or trunk opening to the stern of the vessel in an inclined position, and in hanging the outer end of the shaft and the rudder in a vibrating frame, which may be raised by appropriate gearing, and will be similarly raised by contact with the bottom.

A.D. 1873, February 12.—No. 517.

CAMPION, WILLIAM, of the town and county of the town of Nottingham, sewing machine manufacturer, and CAMPION, WILLIAM, of Sneinton, in the county of Nottingham, mechanic.—"Improvements in the mode of turning the welts of knitted or looped fabrics, and in instruments to be employed therefor."

For this purpose a bar of instruments of the character of self acting needles is employed, but instead of turning the instruments over to release them from the loops, they are simply slid away from the needles. Instead of employing instruments of this character, instruments of a similar character to "warp guides" may be employed, having grooves on their backs. A wire is employed in connection with such instruments to pass through the eyes thereof. In using this arrangement the bar of instruments with the wire previously passed through the eyes thereof is hung on to the needle just previous to a slack course being made, and when a suitable number of courses are drawn to form the "welt," the grooves of the instruments are pressed on to the ends of the needles, and the loops stroked on to the needles; the wire is then drawn out from the eyes of the instruments, when the latter may be slid outwards away from the needles.

A.D. 1873, February 12.—No. 518.

RICHARDS, WILLIAM, gas engineer, of Burton Road, Brixton, in the county of Surrey.—"Improvements in machinery and apparatus for charging and drawing retorts used in the manufacture of gas."

This invention consists in the erection of a quadrilateral frame upon a platform mounted on wheels, suitable for running along a tramway in front of the retorts, and is provided with boiler and engine for giving motion to the scoops, rakes, and other parts of the machine.

The essential features are the construction of a platform or platforms in combination with the machine for transporting and storing coals for charging.

The employment of a chain, rope, or band passing round horizontal pulleys, and attached to each scoop for the purpose of propelling it into the retort and withdrawing it therefrom. The formation at the back end of the scoop, a lever groove and short quick screw, or its equivalent, working into a corresponding boss, whereby the scoop is reversed when it has entered the retort to a proper distance, and again righted on withdrawal.

The application of the motion known as the "lazy tongs" to the rake for discharging the retorts.

The arrangement of the stages upon which both the scoops and rakes may rest, together with the contrivance for raising or lowering the stages to the required elevation by means of quick threaded screws, with corresponding screw bosses, and having suitable reversing gear.

A.D. 1873, February 12.—No. 519.

RAMSDEN, JOHN CARTER, of Smith House, in the parish of Halifax, in the county of York.—"Improved means or method of and apparatus for transmitting heat from furnace or other dry heated gases to atmospheric air, or to other gases."

This invention has for its object the utilization of its peculiar property possessed by "rock salt," namely, its power of transmitting heat. This property is employed or utilized for the purpose of transmitting heat from furnace or other heated gases to atmospheric air, and is accomplished by the introduction of a slab of rock salt between the heated gasses and the atmospheric air, in connection with mechanism and for different objects.

A.D. 1873, February 12.—No. 520.

BARFF, ARTHUR, of Merton, in the county of Surrey, gentleman.—(*A communication from Joshua Kidd, of New York, United States of America.*)—"Improvements in the utilization of heat for the generation of steam and in apparatus or appliances employed therefor."

The following are the essential features of this invention—

First. The application of a jet or jets of superheated steam escaping under pressure when used for exhausting the products of combustion from a fire and forcing or impacting the same against the tubes of a steam generator and also for forcing the said products of combustion through suitable pipes or radiators for heating or vaporizing purposes or for extinguishing fires.

Secondly. The placing an auxilliary tubular boiler made of any required shape between the furnace and smoke stack when such auxilliary boiler is combined with an artificial steam jet draught placed between the furnace and said boiler.

Thirdly. Uniting or combining an auxilliary tubular steam generator with the primary boiler or with a separate tank containing the bulk of the water under pressure.

Fourthly. The combination of a jet or jets of super-heated steam with a steam generator made of any required shape when such jet or jets is or are placed between the fire and steam generator and used for the purposes set forth.

Fifthly. A steam generator made of small vertical tubes, having its steam outlet at the top and its water supply pipe connected and open from its lowest part to the supply tank so that when the pressure increases in the generator it will drive the liquid further away from the hottest part of the tubes back to the supply tank, and vice versa.

Sixthly. The combination of a super heated steam jet or jets with a hot air chamber or drying room when the said jet or jets is or are placed between the fire and hot air chamber and used for the purposes set forth.

A.D. 1873, February 12.—No. 521.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from George Laning Kitson and George Washington Carr, both of the city and county of Philadelphia, state of Pennsylvania, United States of America.*)—"Improvements in automatic regulating valves."

The object of this invention is to dispense with the costly governors used in connection with steam engines, and this object is attained by a valve chest forming part of the passage for the conveyance of steam from the boiler to the engine and containing a valve so weighted and so exposed to the action of the steam from the boiler that any alteration in the speed of the engine or any change in the pressure of steam in the boiler causing difference of pressure on opposite sides of the valve in the chest will induce the said valve to expose or obstruct the passage in the chest to an extent proportionate to any increase or decrease in the speed of the engine or in the pressure of the boiler.

A.D. 1873, February 12.—No. 522.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Everett Griscom Passmore, of Philadelphia, Pennsylvania, United States of America.*)—"Improvements in lawn mowing machines."

This invention relates to improvements in lawn mowing machines, and more especially to hand lawn mowers having a revolving cutting apparatus driven by two driving wheels, and consists, first, in arranging the gearing so that any required speed can be communicated to the cutters, the said gearing being conveniently protected by the driving wheels and side plates or frame of the machine. Secondly, in arranging the gearing and studs or shafting on which it turns, so that different sized cog-wheels supplied with the machine may be conveniently used or interchanged to give any required speed to the cutters.

A.D. 1873, February 12.—No. 523.

LYON, REUBEN, of Bristol, in the county of Gloucester, silversmith.—"Improvements in apparatus for communicating between the passengers and guards, and between the guards and engine driver of a railway train."

This invention consists of bellows fitted to each compartment of a railway train, such bellows communicating with a pipe extending along the entire length of the train and provided with a whistle at each end, the same pipe forming also a speaking tube between the guards and driver. On pulling down a handle in any one of the compartments, the whistles are sounded, and at the same time a signal is shown indicating in which compartment the apparatus has been used.

A.D. 1873, February 12.—No. 524.

BROWN, WILLIAM, of Townhead, and **JOHNSTONE, JOHN**, of Auchcairn, both in the county of Kincardine, North Britain.—“Improvements in ploughs operated by steam, hydraulic, or other mechanical motor, and in apparatus used therewith, being also applicable for other cultivating operations.”

The features of novelty which constitute this invention are the arrangement of the ploughs and the arrangement or construction of the anchors.

A.D. 1873, February 12.—No. 525.

SHOLL, CHARLES, of Manchester, in the county of Lancaster.—“Improvements in atmospheric hammers and in apparatus connected therewith.”

I employ lignum-vitæ as a lining for the cylinder. I also make the piston of similar material. I provide the stuffing box with pneumatic leathers. The piston discs are provided with leathers. I arrange a friction-brake and a tightening pulley in combination with the hammer. I use with the said hammer a disc for heading bolts. I provide the cylinder with a number of taps to regulate the length of stroke and force of the blow. I connect the piston in the hollow hammer tupp directly to the crank. I suspend the hammers from girders or other suitable supports on the ceiling or wall so that the anvil block will be independent of the said hammer.

A.D. 1873, February 12.—No. 526.

EMMENS, STEPHEN HENRY, of 8, Old Jewry, in the city of London, scientific referee.—“A new and improved construction of railway for locomotive purposes.”

The novelty of the invention consists in the construction of a line of railway in sections according to the undulations of the land over which it runs, supported upon sheaves or posts, the beginning and ending of each section being provided with a drum and endless rope driven by stationery engines or other equivalent. The foremost carriage of the train travelling on this line is provided with a clutch or coupling, that when entering upon one of the sections of such line at once becomes connected with the rope, and also starts the engine. This rod is also constructed so as to open and close check gates, which prevent the passing of trains running in an opposite direction. The power or weight of descending trains is utilized in the working of the other train, and the check gates are provided for the purpose of preventing collisions, as one train cannot pass another only at crossings provided for the purpose, at a distance midway between the extremes of any one section. The whole of the line and apparatus giving motion to the trains being worked automatically.

A.D. 1873, February 12.—No. 527.

JEFFS, JAMES, of Bromley-by-Bow, in the county of Middlesex.—“Certain improvements in mechanism or apparatus to be employed for ironing and glazing textile fabrics, paper, or other similar and like substances.”

The novelty of the invention consists in mounting above a table or bed a slotted radial arm supported by a vertical shaft. Within the slot of this arm a block carrying a smoothing iron or agate or other burnisher is caused to slide to and fro actuated by tappets, the object of which is to iron or burnish textile fabrics or paper traversing over the surface of the table.

A.D. 1873, February 12.—No. 528.

HARRISON, CHARLES WEIGHTMAN, of High Holborn, in the county of Middlesex, gentleman.—“Improvements in obtaining oxygen.”

This Specification describes obtaining oxygen from atmospheric air by passing the air into suitable porous substances or by precipitating the oxygen of the air by magnetic or electro magnetic action.

A.D. 1873, February 13.—No. 529.

WYATT, JOHN, of Slapton, in the county of Devon.—“Improved apparatus for signalling between the different parts of railway trains, and applicable also as a general alarm.”

The apparatus comprises a shaft fitted along the roof of the carriage, having a number of pendant handles (one for each compartment) and a crank arm, which, when the shaft is caused to rock by the passenger, operates a bellows for sounding one or more whistles on the roof of the carriage.

Another lever arm on the same shaft operates a pair of spring clappers for sounding a bell, while a third arm projects a day or night signal on one or both sides of the carriage to show whence the alarm has been given. The audible signals may be operated simultaneously or separately.

A.D. 1873, February 13.—No. 530.

DENNISON, JAMES THOMPSON, of Halifax, in the county of York, drysalter.—“Improvements in the construction and arrangement of domestic fire-places, flues and grates for economizing fuel and space, also reducing first costs of construction.”

These improvements consist in the employment of an ordinary sham front and brickwork back to the height of the opening in the said front with an outlet at or near the top to which is fixed a pipe, which pipe is carried through the house, conveys the heat, and radiates the same. Dampers are provided to regulate the draught.

A space is also provided between the stove and the wall.

A.D. 1873, February 13.—No. 531.

DUNDERDALE, WILLIAM JAMES, surveyor, and HOLT, THOMAS MILLNER, woollen merchant, both of Huddersfield, in the county of York.—“Improvements in tables.”

This invention relates to round, oval, hexagonal or other non-rectangular tables, such as those used in hotels, restaurants, smoke rooms, and other places, and has for its object the capability of adding two or more tables together in order to obtain any required rectangular surface to be used as a dining table or other required purpose.

For this object each table top has hinged to it a number of flaps or pieces, each having its inner edge of the same curve or shape as the exterior edge of the original table top, and its other edges are rectangular.

When the table top is in its original condition, the flaps are folded underneath the table, and there held by bolts, but if the table top is required to be square or rectangular, the flaps are raised level with the surface and bolted, and when two or more tables are made rectangular they can be joined or added together to make one or more large tables.

A.D. 1873, February 13.—No. 532.

ARMSTRONG, JOSEPH, of Rotherham, in the county of York, railway wheel manufacturer.—“Improvements in the manufacture of wheels for railways and for other uses.”

For this purpose the part between the nave and rim is formed of two plates of iron or steel, said plates being blocked into the requisite shape. The plates and parts to form the boss are then heated and welded into one solid piece at the nave, and a filling piece and the two plates are also welded together at the outer edge, so as to form a solid rim, or this part may be welded solid at intervals and bolted between. The tyre may be applied in any suitable manner.

A.D. 1873, February 13.—No. 533.

ERMEN, GODFREY, of Manchester, in the county of Lancaster, manufacturer.—“Improvements in apparatus for economising fuel in house fire grates.”

My invention consists in applying an air receiver or warmer at the bottom, back, and sides, or any of such parts of fire grates. These air receivers or warmers are supplied with cold air either from the inside or from the outside of the house or other premises; the air in the receiver or warmer is heated by the fire in the grate; and the heated air escapes through outlets in the receiver or warmer into pipes, by which the heated air is conveyed into any convenient part of the room or rooms or premises to be heated. In conjunction with or independently of the air receiver or warmer above described, I apply a cover or lid over the fire grate, to receive the top heat from the fire and to transmit or reflect it into the apartment.

A.D. 1873, February 13.—No. 534.

OWEN, CHARLES, of 46 and 48, City Road, London, in the county of Middlesex.—“Further improvements in electrical intercommunication between passenger and guard, guard and guard, and guard and engine driver.”

When it occurs that a foreign carriage or other carriages not fitted with my apparatus as described in my Specification of Patent No. 3512, November 23rd, 1872, have to be attached to a train already so fitted, I adopt the following means to complete the circuit of electrical communication throughout the train:—Two screw clips are made to clamp on the eave of each end of the carriage, to which clips are clamped two gutta-percha covered copper wires running from end to end of such carriage or carriages. On each clip are fitted two eyes or rings, each of which is attached to one train wire. A stout spring being fastened to the screw clip and pressing on the said eyes or rings ensures perfect contact when the carriages are coupled together. In the event of any of the carriages becoming disconnected by accident, the guards are apprised of the fact by means of a metal plate being screwed at the top end of such coupling, and when such coupling becomes perfectly taut, the metal plate is brought into contact with two brass studs fixed at the bottom of coupling box, which studs being connected to train wires complete circuit of electricity when brought together and cause bells to ring in guards' vans. When a carriage or carriages have to be slipped and left at any given station or siding, I make use of the slip coupling as follows:—The ordinary coupling wires are separated in the centre and two telescope tubes are introduced, the inner or sliding tubes are sprung, and a tipping piece soldered on to the end slips into a groove turned inside the outer tube when the inner tubes are pushed home, thus preventing accidental slipping caused by the motion of the train, but are readily self released on sufficient tension being applied when the carriages are required to be slipped.

A.D. 1873, February 13.—No. 535.

PARKER, ALFRED JOHN, of No. 27, Queen Margaret's Grove, Mildmay Park, in the county of Middlesex, printer.—“Improvements in machines for printing.”

This relates to the construction and arrangement of treadle platten machines, and to improvements in the details thereof, whereby the printing is effected in a more expeditious manner with less wear and tear of the working parts, a more perfect inking of the type is effected, and a better impression is obtained than is usual.

A.D. 1873, February 13.—No. 536.

MARSTERS, SADDLETON, of North Runckton, near Lynn, in the county of Norfolk.—“Improved means and apparatus for cooling beers and other liquids.”

This relates to submerging $\frac{1}{2}$ inch pipes or less than $\frac{1}{2}$ inch pipes, in a cooling trough, constantly supplied, and in which the liquid is broken up into fine streams under pressure.

A.D. 1873, February 13.—No. 537.

ALLEY, STEPHEN, of Glasgow, in the county of Lanark, North Britain, engineer.—“Improvements in dressing shirts, and in apparatus therefor.”

The carrying out of the invention comprises several stages subsequent to the starching of the shirt in the usual way.

In the first stage the shirt has inserted within it a flat board or plate on which parts of it are folded. For the second stage the boards with the shirts on them are carried by bands or otherwise with a slow progressive movement through a stove for the drying process technically termed withering. In the third stage each board with the shirt on it is passed through a calendering machine. In the fourth stage the shirts are taken off the boards and the plaits are separated in the usual way by means of blunt knives. In the fifth stage the collars and cuffs are finished, this being effected by means of a pair of short heated rollers, held in a framing so as to overhang, and revolving with different surface speeds so as to have a glazing action. The rollers used in the third and fifth stages are by preference heated by streams of heated oil or other liquid, or by means of gas jets.

A.D. 1873, February 13.—No. 538.

BURFITT, CHARLES, of Surrey House, New Wimbledon, in the county of Surrey, civil engineer.—“The manufacture of a new composition for the removal and prevention of incrustation in steam-boilers.”

The above composition not only effects the removal of old deposits, and prevents any fresh incrustation

from forming, but effectually preserves the iron, and at the same time is free from any ingredients that are injurious to the cocks, valves, or other portions of the machinery.

The composition is manufactured in three forms for the convenience of users.

The *block* form can be applied to stationary boilers through the man hole.

The *liquid* form can be applied to stationary or locomotive boilers through feedwater cistern, or through safety valve by shutting off the steam.

The *paste* form contains ingredients almost identical with the liquid, and is in fact a highly condensed form of the liquid. It is manufactured for the especial purpose of saving space and expense in transit. On being liquidized in warm water it can be applied to boilers in same manner as the liquid form.

A.D. 1873, February 13.—No. 539.

NOAD, JAMES, of Bower Road, Hackney Wick, in the county of Middlesex, engineer.—“Improvements in the manufacture of sulphurated lead, in apparatus therefor, and in its application to various useful purposes.”

My invention relates to the manufacture of a compound of sulphur and lead, which possesses very peculiar properties, and is applicable to many useful purposes. I use two pots placed over separate fires, and connected by pipes with a mixing chamber. The latter is to be provided with an inlet pipe for air or steam, and an outlet pipe leading to a condenser. It also has a rake or rabble. I melt lead in one of the aforesaid pots, and sulphur in the other; when the lead is heated to about 710° Fahrenheit, and the sulphur to its melting point, I open the communications, allow the liquids in the proportion of five parts lead and one part sulphur to flow into the mixing chamber. The lead has by this treatment been converted into a dark grey brittle powder. The said powder after being ground, sifted, bolted, or floated and dried, will be ready for use for various purposes.

A.D. 1873, February 13.—No. 540.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Kate C. Barton, of Philadelphia, Pennsylvania, United States of America.*)—“An improved machine for sewing sails, tents, tarpaulins, awnings, and similar articles.”

This invention consists first, in the application of tackle for straining the material at the edge. Secondly, in a guiding device for effecting the creasing of the edges. Third, in an arrangement of needles for stitching, in combination with the creasing device. Fourthly, in an arrangement of the said machine upon guide-ways.

A.D. 1873, February 13.—No. 541.

EDWARDS, EDMUND, of 38, Southampton Buildings, Chancery Lane, in the county of Middlesex, engineer and patent agent.—“Improvements in the construction of engines driven by steam, compressed air, or other elastic fluid, or by water, especially applicable to rock boring engines.”

These improvements relate to the arrangement of valves and valve gear in engines in which a piston or pistons are caused to reciprocate in a cylinder. The valves are made cylindrical and are arranged in a line with the centre of the cylinder, either between two pistons connected together, at one extremity of the cylinder. The valve is driven by the pistons or by tappets upon the piston rods at each end of the stroke, suitable ports being described so arranged as to be opened and closed at the proper times by the valve. Different arrangements are described for using two pistons of different diameters, or one piston with a rod of large diameter upon one side of it, so that the reciprocation is effected by alternately admitting and discharging the steam or other fluid from one side only.

In rock boring engines different modes are described of causing the partial revolution of the pistons and rods at each stroke, either by spiral guides and ratchets arranged as described, or by the emission of the driving fluid from the valve; and arrangements for feeding the cylinder forward after each stroke are described, consisting of a screw and nut driven by a ratchet wheel and moveable pall, or of a differential screw, or of a hydraulic cylinder and plunger, or of a rack and pinion driven by a tangent wheel and screw and arranged so that they can be readily thrown out of gear.

The apparatus is fixed to standards by three points of support connected to a segment of a sphere by a bolt, so as to allow sufficient latitude of adjustment in every direction.

Stuffing boxes are described through which the piston rods passes, consisting of metallic or other rings fitted to the piston rod and working within the stuffing box which is bored out, or of leather or other rings surrounding the piston rod.

An arrangement is also described by which the piston rod is made hollow and the drill bar is contained within it being drawn out and fixed as the depth of the hole requires.

For cutting coal an arrangement is described of cylinders and drills fixed side by side upon a travelling frame, so that a continuous cut or groove may be made.

A.D. 1873, February 13.—No. 542.

MCDUGALL, ARTHUR, of the firm of McDougall Bros., manufacturing chemists, of Manchester & London.—“Improvements in the treatment of stable manure & for obtaining useful products therefrom.”

This invention consists in treating stable manure or litter which has hitherto been used only as a fertilizing agent in such a manner as to render it available for use in the manufacture of paper pulp, and consists in thoroughly washing such manure or litter with water by any suitable or well known mechanical contrivance with a view to the removal of the fecal matter therefrom.

The cleansed straw thus obtained may either be treated by any suitable or well known process for the manufacture of the same into pulp for the making of paper and similar products, or it may be dried and again used as bedding for horses and cattle generally.

A.D. 1873, February 13.—No. 543.

VIAULT, JULES, of Melun, department of the Seine et Marne, mechanician, and BERNIER, CLAUDE NOËL, son, of the department of the Loire, merchant, both in the Republic of France.—“An electric detonating disc and other signals for preventing railway accidents, applicable to railways.”

This invention relates to a series of signals all worked by means of a rail placed in the middle of the way between the two ordinary rails, and lowered by a wheel carried by the locomotive.

This centre rail is raised about six inches above the level of the ordinary rails, and attached to it are two racks gearing with a pinion enclosed in a box sunk between the rails; the axle of this pinion passes to another box placed outside the way, and by a toothed wheel at that end actuates another pinion upon a vertical shaft enclosed within a column and carrying at the top a disc, red on one side and white on the other.

One of these signalling apparatus is placed at each approach to a station, the two being in connection, and working so that when a train runs into a station the signals cover the line both before and behind it. At the same time the chains passing over a pulley on each vertical shaft and connected by an iron wire which connects the two discs, also cause an electric bell to sound until the discs are reversed and the line open. These chains are also connected by a lever with a bellows provided with a horn which is thus made to sound at points or level crossings. The racks also act upon a lever which places a detonating signal on the line to be exploded by the passing locomotive, finally to signal the falling in of a bridge or its being carried away by flood, the wire connecting the two signalling discs is passed between the cutters of a shears kept open by a spring between its two handles or levers, one of these being connected by a chain with the arch of the bridge so that should this arch give way the cutters close, cut the wire, and set the discs of each column at danger.

A.D. 1873, February 13.—No. 544.

ASH, GEORGE CLAUDIUS, of 141, Maida Vale, in the county of Middlesex.—“Improvements in the manufacture of hats and coverings for the head.”

This Provisional Specification describes interposing metal foil between the inner and outer surfaces of the hat to prevent grease soaking through.

A.D. 1873, February 13.—No. 545.

HIGHTON, HENRY, M.A., of Putney, in the county of Surrey.—“Improvements in electric telegraphs.”

This Provisional Specification describes special arrangements by which the gold leaf instrument is applied advantageously to work long lines, especially where the insulation is defective.

A.D. 1873, February 13.—No. 546.

SCHOFIELD, JOHN, crabber, in the employ of William Eddleston and Company, of Sowerby Bridge, in the county of York, dyers and stovers, and MELLOR, WILLIAM, of Sowerby Bridge aforesaid, mechanic.—“Improved machinery or apparatus for smoothing and pressing textile fabrics.”

This invention consists in the construction of a machine to be employed for the purposes of smoothing and pressing or finishing fabrics in lieu of the steam press heretofore used for the purpose of pressing and finishing fabrics, and consists of suitable framework carrying a number of guide rollers and steam cylinders for smoothing and finishing the fabric.

A.D. 1873, February 14.—No. 547.

WILLANS, JACOB GEOGHEGAN, of 9, Saint Stephen's Crescent, Bayswater, in the county of Middlesex.—“Improvements in the manufacture of iron and steel.”

Ore in a divided state is employed together with materials to prevent its falling through the interstices of the fuel.

Apparatus is also described for charging the furnace.

Improvements on the “uchatius” process are also described, and granulated metal is produced for the manufacture of steel and malleable castings.

A.D. 1873, February 14.—No. 548.

GERCKE, KARL LUDWIG HARTWIG, Phil. Dr., from Berlin, in Prussia, at present residing 14, Alfred Place, Bedford Square, London.—“A new cartridge for breech-loading small arms, with a new form of bullet, and a greased paste-board bullet-cup to prevent fouling.”

The said new composition of cartridges for breech-loading guns, applicable both to metal and paper cartridges, contains the following principal parts:—

A, the bullet, which has the following form (*Fig. 1*): length 25 millimetres, diameter 9 mm., weight about 33 bullets to the lb., with an ogive-elliptical form of the ends, and a small flattening at the tail, and with the centre of gravity precisely in the centre of the length of the projectile. The principal advantages of this bullet are; *a*, its smooth well balanced form, with the centre of gravity in the centre of its length, and with its axis always coincident with the line of trajectory, throughout its flight; *b*, its light weight, and great initial velocity with a very flat line of trajectory giving a remarkable accuracy of fire.

B, the greased paste-board bullet-cup, which has the following form (*Fig. 2*): height, 16 mm., with a bottom $3\frac{1}{2}$ mm. thick, and a hollow fitting closely around the bullet up to the centre of its length, and with four fine incisions from the top 12 mm. downwards. It fits closely into the grooves of the barrel and into the cartridge, and being greased by dipping it into melted hot fat until nearly saturated, it is topped by a rim of fat around the bullet, which securely closes up the cartridge. The fat is composed of paraffine, japan wax, and oil, in equal parts. The principal advantages of this greased bullet cup are: *a*, it keeps bullet clear of the grooves, and cleans the barrel throughly after every shot, completely preventing fouling from either powder or lead; *b*, it imparts its own rotation to the bullet, but lets it free, when leaving the muzzle, to follow its course without any further impediment, the four incisions serving to open the cup by the force of the resisting air.

The distinctive advantages of this new cartridge (*Fig. 3*) are after this explanation, as follows:

1. Great accuracy of fire, even at the longest distances, with the possibility of ranges of 2000 yards and more.
2. Complete absence of fouling even after hundreds of rounds.
3. Perfect protection of the powder from ever getting wet.

A.D. 1873, February 14.—No. 549.

KERSHAW, HENRY, of Laister Dyke, near Bradford, in the county of York, worsted spinner.—“Improvements in means or apparatus employed in spinning worsted and other fibres.”

The invention relates to means by which to avoid the formation of “double” or irregular yarn by a broken thread in its passage to one spinning spindle catching on to and being carried along with the unbroken yarn to another spindle.

This is proposed to be effected in the present case by an extension upwards of the eyes applied in the top board or rail to conduct the yarn from the feed rollers to the spinning spindles.

These extensions may be formed by elongations of the eyes, or by separate small tubes applied over them, such tubes having slits in the direction of their length, corresponding with those in the eyes for the passage of the yarn, and being formed of pot ware, glass, brass, or other suitable material.

A.D. 1873, February 14.—No. 550.

STONE, FRANCIS GOULD MORONY, of Glasgow, in the county of Lanark, North Britain, civil engineer.—“Improvements in sluices or stop valves.”

A sluice or stop valve constructed with the improvements consists of a cylindrical shell of metal, which is placed vertically, and which is of a length sufficient for the top to be above the upper water level when the valve is closed down. This cylindrical shell is above a circular sluice opening, by which the water enters the duct or passage leading it off, and this opening is provided with a conical rim or seat, in which a counterpart conical rim on the bottom edge of the shell or valve fits when the latter is closed down. With this construction the valve is in equilibrium as regards the water pressure, and its weight is counterbalanced either by having a hollow jacket formed round it to act as a float, or, as is preferred, by means of a counterweight connected to it by a lever.

A.D. 1873, February 14.—No. 551.

HUTCHISON, DAVID, of Mile End, and BRIDGES, WILLIAM GEORGE, of Stepney, both in the county of Middlesex.—“An improved composition for removing and preventing incrustation in boilers.”

The features of novelty of this invention consist in combining together catechu, chlorine, linseed, sodium, nitre, sulphate of potash, alum, calcium, and ammonia, in certain proportions.

A.D. 1873, February 14.—No. 552.

ADAMS, JOHN, of Landport, Portsmouth, in the county of Hants, naval engineer.—“Improvements in apparatus to be applied to steam or hot air engines for using the steam or air expansively.”

I attach a small cylinder provided with a piston to the steam chest or other convenient part of the engine; a rod is connected with the said small piston, and with an expansion valve in such a manner that it varies the motion of the said expansion valve according to the pressure of steam, so that whatever may be the initial pressure or the pressure at the beginning of the stroke of the said engine, the final pressure after expansion is the same.

A.D. 1873, February 14.—No. 553.

NEWTON, ALFRED VINCENT, of the Office for Patents, 66, Chancery Lane, in the county of Middlesex mechanical draughtsman.—(A communication from Michele Uda and Mary Bella Scott Uda, both of Milan, in the Kingdom of Italy).—“Improvements in the construction of extension ladders.”

The ladder is composed of detached portions or sections of a tapering form, the ends of which are fitted with metal socketed terminations, and when brought together they are secured by means of a transverse bar forming a round of the ladder, or by pins, or otherwise.

A.D. 1873, February 14.—No. 554.

SHEPHERD, WILLIAM HENRY, of Bradford, in the county of York, spinner and manufacturer, and SCOTT, JAMES, of Bradford aforesaid, overlooker.—“Improvements in machinery for combing wool and other fibres.”

The object of this invention is to clear or cleanse the noil end of the tufts detached from the bulk of the fibre.

To effect this object we apply to the interior of the circular comb a similar comb, but of less diameter, and rotating eccentrically therewith; the teeth of the interior circle are in close approximation to the teeth of the larger or outer circle at the point opposite and nearest the feeding head.

A.D. 1873, February 14.—No. 555.

CHAPPELL, ALLEN, of Linthwaite, near Huddersfield, in the county of York, working engineer, and CHARLSWORTH, JOHN, of Linthwaite aforesaid, carding engineer.—“Improvements in apparatus for feeding wool or other fibrous material to carding or other machines of a like class.”

[No. 7.]

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The object of this invention is to remedy certain defects in carding engines of a similar class to that for which Letters Patent were granted to Philip Charles Evans and Henry James Hogg King, dated the 20th January 1869, No. 184, by providing a simple means of temporarily suspending the action of the fibre supplying roller, and to ensure the deposit of fibre on the feed sheet at a proper time.

A.D. 1873, February 14.—No. 556.

ATKINS, FRANCIS HENRY, of 62, Fleet Street, in the city of London, engineer.—“Improvements in apparatus and in the materials and appliances employed for the filtration of water, sewage, and other fluids, whereby manure and other valuable products are separated, precipitated, and obtained therefrom.”

One part of this invention has for its object improved arrangements of apparatus and mechanism for the filtration of water, sewage, and other fluids, being specially adapted for the separation of the grosser impurities from water for manufacturing and other purposes, or for filtering the effluent water of sewage, the polluted water from paper or other manufacturing works to prevent the pollution of rivers, or for other purposes.

The invention also relates to the preparation and application of coke in solidified blocks or slabs, for the filtration of water, sewage, or other fluids.

The filtering materials in the form of blocks are secured in open removeable frames or slides. The frames with the filtering blocks or slabs are then placed and fixed in position across a water course, tank, passage, or channel, through which the water, sewage, or other fluid to be filtered is arranged to flow.

Part of the series of frames may contain sponge, felt, or other filtering materials. When the filtering slabs are coated with the impurities they are removed and allowed to dry, and are cleansed by scraping, the scrapings being converted into manure.

According to another of these improvements, the grosser impurities are withdrawn from water, sewage, or other fluids by means of endless bands of wire gauze, hair cloth, canvass, sponge, or other suitable materials mounted upon rollers, and arranged so as to revolve in a tank or passage, through which the fluid to be filtered flows.

Another part of these improvements has for its object the application of galvanic, magnetic, or electrical action to filtering apparatus, reservoirs, or tanks, for the purpose of precipitating organic and inorganic matters or impurities held in suspension or solution in the water or other liquids.

A.D. 1873, February 14.—No. 557.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from Jonathan Ostrander, of Richmond, county of Henrico, state of Virginia, United States of America.*)—“Improvements in the manufacture of nut blanks, and in machinery and apparatus connected therewith.”

This invention relates, firstly, to a peculiar mode or method of manufacturing nut blanks by making such blanks from a crude pile by a succession of passes between rolls, which gradually reduce the said pile over a core or former to the desired shape of the nut bar, and by subsequently severing the said bar into lengths, as set forth hereafter, nut blanks of a superior quality as regards strength and solidity being manufactured by this process.

Secondly, to peculiar machinery for conducting the above-mentioned manufacture; and,

Thirdly, to certain piles which the inventor prefers to use in making the nut blanks.

A.D. 1873, February 14.—No. 558.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Charles Francis Ritchell, of the city and state of New York, United States of America, mechanical engineer.*)—“Improvements in multiple crank apparatus for drilling, boring, or similar operations.”

This invention relates to an improved construction and arrangement of multiple or serial cranks whereby any number of cranks very closely set can be simultaneously operated for mechanical purposes.

A.D. 1873, February 15.—No. 559.

ESPIE, WILLIAM HONYMAN, of Torbanehill, residing at Number 46, Melville Street, Edinburgh.—
"Improved apparatus for stopping tramway cars."

The appliance consists of iron prongs attached by means of easily worked joints to an iron beam running along the bottom of the car lengthwise. These prongs are, by means of a vertical lever and rod, placed under the power of the driver, so that he can in cases of necessity, by simply pulling the handle of the lever, cause the iron points to drop, and the sharp points thereof to enter the street, and thus arrest the motion of the car. On a like principle iron drags wrought in a similar manner by the conductor at the front and end of the car are cast out behind, which taking hold of the pavement stones, aid in arresting the motion of the car, and likewise steady it when arrested.

A.D. 1873, February 15.—No. 560.

WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Frantz Büttgenbach, of Heerdt, near Düsseldorf, Germany.*)—"Improvements in blast furnaces."

The objects of this invention are diminished cost of construction and increased durability of blast furnaces and increased economy in working the same. The body or stack of the furnace is made distinct or separate from the boshes and is supported by a ring of brickwork supported on brick piers. The said boshes are connected to the stack and are fitted with water blocks. The stack is in some instances provided with cones for carrying off the gases from the centre of the mouth. These gases are conducted down through the stack to an annular main which surrounds the base of the stack. The platform or staging at the mouth of the furnace may be supported by gas tubes. The furnace is provided with a closed breast formed by a cast iron plate.

A.D. 1873, February 15.—No. 561.

WATER, HENRY CHARLES, of Horsham, in the county of Sussex.—"An improved supply and stop valve."

The principal feature of this invention is a combination of two valves, one to regulate the supply of water and the other held constantly open except when the former is closed for repairs, when it closes; as described in the accompanying Provisional Specification.

A.D. 1873, February 15.—No. 562.

MUSSEN, THEODORE ANTHONY, of 23, Abchurch Lane, King William Street, in the city of London.—(*A communication from Reiner Daelen, of Neuss, in the Empire of Germany.*)—"Improvements in the manufacture of iron and steel, and in apparatus employed therein."

The Provisional Specification describes lining a bessemer converter with iron ore mixed with binding material, the lining covering some of the tuyeres at the commencement of blowing. After the termination of the process the bottom half of the converter is taken off and relined.

A.D. 1873, February 15.—No. 563.

WELLY, CHARLES, of Pontsmill, near Saint Blazey, in the county of Cornwall, mine agent.—"Improvements in mining streams of water and treating the deposit."

The invention relates to the form and arrangement of the apparatus and filters, and their adaptation to be cleansed by the work, or made self cleansing.

A.D. 1873, February 15.—No. 564.

DEE, WILLIAM ARMAND, of the firm of L. de Fontainemoreau & Co., patent agents, 4, South Molton Street, in the county of Middlesex.—(*A communication from Maria Procopé, of Stockholm, in the Kingdom of Sweden.*)—"Improvements in the manufacture of fishing and other nets, and in the machinery and apparatus employed therefor."

This invention consists in improvements in machinery or apparatus for making fishing and other similar nets, whereby the knot formed is similar to that known as the "hand knot" (as made when knitting fishing nets by the hand), by means of improved machinery or apparatus, the knot being formed by means of a peculiar shuttle motion and two threads.

A.D. 1873, February 15.—No. 565.

VINCENT, WILLIAM, of Newland, in the parish of Hurst, in the county of Berks.—"Improvements in fuel for heating and illuminating purposes."

The inventor takes chalk or limestone and dries, and afterwards mixes with, or steepes the same in, naphtha, paraffin, or other hydrocarbons, turpentine, or oils; and he afterwards dries the substances so treated, which can be done by placing it in sheds and allowing the same to become gradually dried by the operation of the atmospheric air. When dried it is ready to be used for gas making or to be burnt for fuel.

A.D. 1873, February 15.—No. 566.

LEA, WILLIAM, junior, of Wolverhampton, in the county of Stafford, brass founder.—"Improvements in roller blind movements or furniture."

This invention consists in connecting to one of the brackets of a roller blind, first, a small pulley, and beneath this a screw pin having washers thereon, a spiral spring, and an ornamental screw nut. The roller cord is drawn over the small pulley, passes between the washers through a hole through the screw pin, and is tightened up according to the weight of the blind by turning the screw nut as may be required to regulate the ascent or descent of the blind.

A.D. 1873, February 15.—No. 567.

COCKSHOT, RICHARD, of Bradford, in the county of York, general dealer.—"A new or improved oil or lubricant."

The oil is made as follows:—

To one gallon of water I add two ounces of Irish moss and two ounces of "Newcastle soda." This admixture I boil for about twenty minutes and then add one gallon of gallipoli or rape oil, which on stirring the whole becomes thoroughly incorporated and is an oil or mixture admirably adapted for use on fibres and is likewise noninflammable and unaffected by the action of frost or cold.

A.D. 1873, February 15.—No. 568.

GREENWOOD, GEORGE, SAVILLE, THOMAS, and MORTON, JOSEPH, of Halifax, in the county of York, fire-brick, tile, retort, and sanitary tube manufacturers.—"Improved means and arrangements for heating rooms or buildings."

Our improvements consist in using exhaust steam, and allowing the same to pass underneath or into and in direct contact with the metal floor plates of the drying room, whereby we greatly economize fuel and also first costs in the construction of such rooms.

A.D. 1873, February 15.—No. 569.

PATISON, JOHN, of Airdrie, in the county of Lanark, North Britain, manufacturing chemist.—"Improvements in the destructive distillation of coal and shale for the production of illuminating gas, fuel, and oil and other products therefrom, and in the apparatus therefor."

This invention consists of an improved mode and means of carrying on the permanent or continuous destructive distillation of coal or shale, or a mixture of these with other organic substances, or heated bricks, coke, scrap iron, or other such equivalent, for the production of said products and hydrocarbons for lighting, heating, and other purposes, by feeding the said materials to be treated into long cylindrical iron, clay, or other retorts capable of standing the great heat required for the particular gases or vapours being distilled over by them. The retort is laid at an angle with close ends, and has the material to be treated (suitably broken up) charged or fed into a hopper or mouthpiece at the highest end, fitted with a tapered charging plug

and weighted lever, which, when lifted by the operator, admits the charge and again closes the throat when let go. The materials thus charged into the throat, may, by a feeding screw fitted in it, be further fed into the upper end of the retort, which is itself fitted with a long screw shaft or shafts, having the screw formed to act as a continuous screw by angled radial blades fixed or formed on the spindles, and which, with angled teeth at the upper end, draw in and compress the material through the upper contracted end, and screw it slowly to the far lower end of the retort, loosening and stirring it to free the gaseous products in its course, while the destructive distillation is constantly going on, room being left at the top for their free exit at the highest part from one large pipe or several small ones for their subsequent purification, condensation, or other treatment and use in a usual manner; the residuum and solid carbon being discharged through a close duct at the lower end into water, or close vessels, or otherwise, for subsequent use in heating the retort, or for other purposes in a usual manner. First, and specially for distilling off the great part of the hydrocarbon compounds at low temperatures by these improvements from the coal and shale, or their mixture with other substances, iron retorts may be used and heated in the inside, by the admission or injection of superheated steam or other vapours or gases, maintained steadily at the lower temperature until the eliminated gases are exhausted from the material being treated. But secondly, and specially for the distillation of the said substances and their mixtures, for obtaining the greatest amount of illuminating or permanent gases, and freeing the residuum of all volatile matter, a much higher steady heat is employed, and the retorts are thus preferably formed of fire clay or other equivalent, and heated from the outside in a usual manner by fuel or gas heating close furnaces; and in this second case it is preferred to lead the vapours generated through highly heated bricks, coke, scrap iron, or other equivalent, in a close chamber or retort, so as to decompose the hydrocarbons, and thus eliminate or produce the greatest possible quantity of the permanent gases desired. The one end of each feeding and conducting screw shaft would pass out through a fluid tight stuffing box in one end of its respective retort, so as to be driven by gearing outside. When by the said first distillation (as at low temperature) the treatment is not carried on, so as to eliminate all the oils from the residuum, these residua could be run off while hot by a pipe and tap for the purpose, at the lowest part of the retort. To use and treat the nitrogeous liquid products (obtained by the said first distillation at low temperatures) they are neutralized with acids to form salts on evaporation in the usual manner; and to use the hydrocarbon oils, these may be distilled, condensed, refined, and purified by acids and alkalies, all in the usual manner. But these said crude hydrocarbon oils obtained by the first treatment, or such hydrocarbons obtained from other sources, may by another improvement be heated to 80° or 90° Fahrenheit and led by pipes controlled by taps from a suitable heating or other cistern above, through the lower part of the retort and the said highly heated residuum therein, so as by a second or double distillation to be decomposed or eliminated into the permanent or illuminating gases desired; and by another treatment this latter improved second or double distillation of the hydrocarbon oils may in like manner be performed or executed in ordinary retorts, as well as in the constant acting cylinders with feeding and conducting screw spindles revolving in them.

The final solid residuum or carbon obtained from any of these improved processes may subsequently be ground for blacking or used for charcoal or fuel for heating the retorts or for other ordinary heating purposes.

A.D. 1873, February 15.—No. 570.

SCOTT, HENRY YOUNG DARRACOTT, of Ealing, in the county of Middlesex, Major General, C.B.—“Improvements in the deodorization of excreta, and in the manufacture of manures therefrom.”

The object of this invention is the prevention of nuisance in dealing with night soil and urinous liquids, and the fixation of their fertilizing elements so as to render them valuable marketable commodities.

A.D. 1873, February 15.—No. 571.

MILLER, THOMAS WILLIAM, of Blackheath, in the county of Kent, engineer.—“Improvements in ordnance and in breech loading small arms.”

This invention has for its object the increasing the projectile force of ordnance and breech-loading small arms, and consists in making the powder chamber or breech end of the gun or small arm of larger diameter than the bore of the said gun or small arm, such chamber being by preference in the form of a hollow truncated cone having either a flat or a more or less concave base, the narrowest part of the said chamber corresponding in diameter to the bore of the gun or small arm.

A.D. 1873, February 15.—No. 572.

DARLING, WILLIAM, and SELLERS, ROBERT, of the Airedale Works, Keighley, in the county of York, machine and engineers tool makers and ironfounders.—“Improvements in means or apparatus for cleaning, “trimming, or dressing the teeth of wheels and of racks.”

Supposing the object to be operated upon to be a wheel, such wheel is supported so as to be capable of freely revolving on a moveable carriage or slide, and this carriage or slide has progressive to and fro movement given to it by cams or tappets, so as to carry the teeth to be acted upon past and in contact with the grinding or cutting surface of a revolving disc of the desired form,

The carriage or slide also supports an arm or arms for carrying the driver by which the required step by step movement is given to the wheel under operation for change of teeth subject to the cutter or grinder, and the stop for retaining or holding the wheel between each change of movement effected by the driver, so as to keep the wheel steady during the grinding or cutting action thereon. The progressive movement of the wheel for change of teeth is obtained from the movement by which the teeth are moved into action with the cutting surface, and the distance of such movement each time is adjustable to the pitch of the teeth of the wheel under operation, whilst the position of both driving and holding means are adjustable to the size of such wheel.

Worm wheels or wheels with teeth at an angle may also be similarly operated upon by variations in the holding means.

The grinding or cutting disc is formed of composition or other suitable cutting or grinding material affixed to an axis, to which the required rotary motion is given by a strap or band, or by other suitable means.

The teeth of racks may be similarly operated upon by substituting a sliding for the rotary motion, and the teeth of more than one wheel or rack may be held and operated upon at the same, if desired.

A.D. 1873, February 15.—No. 573.

BAKER, WILLIAM FREDERICK, of 14, Old Jewry Chambers, in the city of London.—(*A communication from Abraham Bogardus, of Matteawan, Dutchess county, in the state of New York, United States of America.*) —“Improvements in the manufacture of hats, caps, and bonnets.”

According to this Provisional Specification skins either with the hair on or off are waterproofed with paraffin, then cut to a circular shape and blocked to form.

A.D. 1873, February 15.—No. 574.

MOORHOUSE, JOHN, of Windhill, Idle, near Leeds, in the county of York, machinist.—“Improvements “in fire ranges.”

The front bars of the range I construct closer or nearer each other than heretofore and of less depth, the upper portion of the fire [*being closed by means of sliding doors, the top of the fire**] being covered by a hot plate of the ordinary construction; the back part of the bottom bars is provided with a projecting stud one at each side of the said grate; the front part of the said bottom bars is supported by pins attached to knobs projecting from the front of the range; when these pins are withdrawn the bottom grate is free to swing on the studs at the back side of the grate and so as to readily remove the dirt or fine ashes from the fire. The flues are arranged so as by dampers and “end irons” to change or divert the heated gases from the oven to the boiler side of the fire and vice versa. The grate bars may be either vertical or horizontal.

A.D. 1873, February 15.—No. 575.

LEWIS, JAMES, of Birmingham, in the county of Warwick, metallic bedstead manufacturer.—“Improvements in fire grates or stoves, and in cooking, baking, and heating apparatus.”

This invention consists in making the frame, or top and side plates of fire grates or stoves, of a convex figure, so that when the grate or stove is set, the fire bars carried thereby project into the room instead of being in a recess a foot or more from the wall of the room as usual. The bottoms of fire grates are made capable of oscillating for the purpose of removing the ash, and promoting the combustion of the fuel.

* The words “being closed by means of sliding doors, the top of the fire” are found in the copy of the Abridgment delivered by the Applicant, but do not appear in the original Abridgment.

Fixed bars passing from the front to the back of the grate are used in combination with the oscillating grate bottom for stirring up the fire. The cooking and baking apparatus consists of a circular body with a central fire placed close at top. This body is divided by radial flues into a series of ovens, which are heated by the heat from the central fire place. The apparatus is so mounted upon a vertical support or column, that it can be rotated for bringing the several ovens in turn to the front of the recess in which the apparatus is placed.

Apparatus for heating water is combined with the central fire place.

A.D. 1873, February 15.—No. 576.

EMMENS, STEPHEN HENRY, of 8, Old Jewry, in the city of London, scientific referee.—“Improvements in apparatus for producing heat and light.”

The novelty of the invention relates to further improvements upon Letters Patent granted to me on the 16th day of August 1872, No. 2453, and consists, first, in a further development of the heating portion of such Patent, the novelty of which consists first in passing a portion of the products of combustion escaping up the chimney into and through the fuel tank, by which they become impregnated with spirit and passed into the furnace; secondly, in providing the entrances or front of furnaces with an air tight apparatus having two compartments, one of which receives the air or other oxydising agent, and the other the vapours from the fuel tank. From these chambers the gases pass together into the furnace where combustion takes place. Secondly, the novelty consists in providing portable or fixed lamps, with passages for air and vapour in one construction. The vapour is generated by heat, and conveyed to the burner, simultaneously with air; the two combining emit a brilliant flame. A second arrangement consists in impregnating the air with oil whilst being forced through a wick saturated with the same; and, lastly, in constructing two passages for air to the burner, one of which conducts the air through a wick saturated with hydro-carbon spirit, and the other the air, which when mingling with each other combustion takes place, and a brilliant light ensues.

A.D. 1873, February 15.—No. 577.

HARRISON, WILLIAM WHEATCROFT, of Montgomery Works, Fargate, Sheffield, electro plate and cutlery manufacturer.—“Certain improvements in the manufacture of knives and forks and in the construction and adaptation of handles thereto.”

The novelty of the invention consists in applying to knives, forks, and other similar cutlery, handles composed of a metal side frame provided with grooves in which scales of ivory or other suitable substances as facings are placed and secured therein, and also to the blade of the knife by means of a tang from the same projecting through transverse stretcher loops and screwing into a nut or recess formed in the interior of the metal surface.

A.D. 1873, February 15.—No. 578.

WOOD, EDWARD, of the firm of John and Edward Wood, of Bolton, in the county of Lancaster, engineers.—“Improvements in steam engines.”

This invention consists, first, in an improved disengaging apparatus for cutting off the steam at different points.

Secondly, in an improved apparatus for governing by the cut off.

Thirdly, in an improved apparatus for stopping the engine when the governor approaches either extremity of its range, or when any accident happens to the governing gear.

Fourthly, in an improved apparatus for closing the supply valve when the governor balls expand or collapse beyond certain limits, or when any accident happens to the governing gear.

Fifthly, in the application of a second governor to steam engines for the purpose of stopping the engine when the first governor fails to act properly.

Sixthly, in the application of syphon boxes to steam engine cylinders, to prevent the accumulation of water therein.

Seventhly, in an apparatus for collecting the water between the high and low pressure cylinders of compound engines.

Eighthly, in an improved variable expansion gear for equilibrium valves.

A.D. 1873, February 15.—No. 579.

McBRIDE, THOMAS, of Woolwich, in the county of Kent.—“An improvement in the manufacture of gold and silver cord used for military trimmings.”

The improvement consists in providing a loose filling to the gold or silver cord, so as to render the same both soft and pliable instead of its being stiff and hard as usually made.

One method consists in placing a pin in the centre of the filling, off which the finished cord is drawn as the braiding proceeds.

The cord when finished, is of the usual size, less material being used for the filling.

APPENDIX
TO
CHRONOLOGICAL AND DESCRIPTIVE INDEX,
CONTAINING THE

Abridgments open to public inspection before the expiration of the term of six months (in consequence of the Patentees having filed their Final Specifications), and also the Abridgments of Complete Specifications received from August 9 to August 15, 1873. These Abridgments will be subsequently printed in the body of the book, in order to preserve the numerical and chronological arrangement.

A.D. 1873, February 17.—No. 580.

QUIN, JAMES, of Leyland, near Preston, in the county of Lancaster.—“Improvements in the manufacture of india rubber valves.”

The defect hitherto existing in valves of this description has been that the valve in opening bends at the point where the two kinds of rubber are united, and hence there was a tendency to break or separate the two pieces at the joint, and it is to remedy this defect that my invention is designed.

The invention consists principally in making the hard rubber centre or hinge piece with a thin tongue or flange projecting from its outer edge in or about the centre of its thickness, which tongue or flange is let into a groove in the inner edge of the soft rubber, and thus not only strengthens the joint but prevents the valve from bending at the point of junction with the hard rubber, and thus obviates the liability of the two parts to come asunder at this point.

A.D. 1873, February 18.—No. 591.

HENDERSON, ARTHUR CHARLES, of the firm of Henderson and Company, British and Foreign patent agents, of No. 31, Charing Cross, in the county of Middlesex.—(*A communication from Gustave Demailly, civil engineer, of the city of Brussels, and Kingdom of Belgium.*)—“Improvements in the purification of water and apparatus connected therewith together with the mode of cleansing the same.”

This invention consists in purifying water before use either in domestic or industrial purposes by a combined chemical and mechanical process, freeing it from calcarious and other matters held in solution, by adding thereto a small proportionate quantity of solution of caustic lime, which troubling the water presents a precipitate formed by the action of the carbonic acid by immediately depositing carbonate of lime, so that instead of having to treat matters in solution it merely remains to operate on matters in suspension.

The apparatus for effecting this consists of a filter formed of a cylindrical vertical case of sheet or cast iron furnished with a lid, in this another cylinder is contained which is the filter proper, also formed of sheets of cast or sheet iron, one at the top and the other at the bottom, and united by three concentric cylinders of perforated sheet iron, these cylinders form two annular capacities supplied with filtering matter composed of felt or wool rendered imputrescible.

The water arrives in the filter by a tap, spreads itself between the envelope and the filtering cylinder, then by pressure it traverses the latter, and makes its exit by a discharge tap perfectly clear and freed from all matters in suspension.

The cleansing of the filter is effected without the necessity of taking the apparatus to pieces, in the following manner, when the steam engine is stopped, the tap admitting water into the filter is closed, as well as the exit pipe communicating with the feed pump which allows of free communication with the central pipe of the filter, and water draught of the generator.

On opening the discharge tap it will at once be seen what has taken place. The pressure of the generator ends the water already purified into the central pipe of the filter, this water traverses inversely the beds or layers of filtering matter and draws along with it the foreign organic matter arrested during filtration and flows out by the discharge tap.

The whole cylindrical body is also movable on a pivot, and is made to revolve so that it comes under the influence of a brush fixed vertically at the inner side of the case, which suffices to dislodge any residue,

[No. 7.—APP.]

(K)

A.D. 1873, February 18.—No. 596.

SAMBROOK, WILLIAM, of Liverpool, in the county of Lancaster.—“Improvements in heating the feed water of steam boilers and in apparatus employed therefor.”

The features of novelty which constitute this invention consist in heating the feed water of steam boilers by the direct application of a steam jet, or jets, from the boiler to the feed. The steam may be introduced into a cylinder or chamber containing a rose or perforated pipe which discharges a spray or shower of water from the feed pump. This steam acts upon the spray or shower and heats it or increases its temperature, the water heated by the steam continuing its course to the boiler.

A.D. 1873, February 18.—No. 606.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from Robert W. Gardner, of Quincy, in the county of Quincy and state of Illinois, United States of America.*)—“Improvements in steam governors.”

The first part of this invention relates to governors in which the valve is opened by a weighted lever and closed by the governor balls, and consists of a fulcrum for the lever arranged to let it fall and close the valve on its working seat when the belt breaks or runs off, the said fulcrum being held in the working position by devices controlled by the strain of the belt and released or tripped by the cessation of the strain.

The second part of the invention is applicable to different governors, and consists of a valve seat of hardened steel or other durable metal secured in the casting of the valve chamber in a novel manner; also a facing of the valve with the same and a mode of applying it.

The third part of the invention consists of a hollow clamping or fastening stem for securing the valve seat arranged to receive a guide stem for the lower end of the valve.

A.D. 1873, February 19.—No. 612.

MORGAN-BROWN, WILLIAM, of the firm of Brandon and Morgan-Brown, engineers and patent agents, of 38, Southampton Buildings, London, and 13, Rue Gaillon, Paris.—(*A communication from Samuel Thomas Thomas, of Gilford, Belknap county, New Hampshire, United States of America.*)—“Improvements in looms for weaving.”

This invention relates to details of construction of fancy looms, and particularly to the class termed “open-shed” looms, in which part only of the warp yarns are moved after each pick to form the shed.

In combination with vertical jacks to operate the elevator and depressor bars, gear-sectors are employed having teeth meshing into teeth on the jack-bars, the sectors have a cam groove, into which extends a roll turning on a pin projecting from the harness lever, so that the sectors affect the rise and fall of the jack-bars.

Another portion relates to the arrangement of the starting and stopping mechanism of the loom by a friction-cone. Also to the drop-box mechanism, in which the boxes are drawn down positively instead of dropping by gravity, and in connection therewith a means of arresting their motion instantly by a set of levers in conjunction with the weft stop motion.

A.D. 1873, February 19.—No. 613.

WESTERN, CHARLES ROBERT, of the Victoria Works, Belvidere Road, Lambeth, in the county of Surrey.—“Improvements in band saws.”

This invention relates to a method of setting band saws so as to make an oblique cut, and to the construction of springs for band saws.

The saw is set for an oblique cut by moving one of the saw pullies laterally, so as to bring the line of the saw in a direction oblique to the table, which may also be made to cant into an inclined position in the usual way.

The spring employed is like a carriage spring, the ends of which bear on the block or framing which carries the upper saw pulley, while a tightening screw passes through the middle of the spring, and is provided with a hand wheel for adjusting the tension.

A.D. 1873, February 19.—No. 618.

WILDE, HENRY, of Manchester, in the county of Lancaster, engineer.—“Improvements in machinery and apparatus for producing, regulating, and directing electric light, part of which is applicable to other purposes.”

My invention consists, first, in improvements in the electro-magnetic induction machine, described in the Specification of Letters Patent granted to me on the 23rd day of March 1867, No. 842.

In the present improvement the helices in which the currents are induced, instead of being coiled round the armatures are coiled round the extremities of the iron cores of the electro-magnets, which are prolonged for that purpose, or have iron cores fixed thereto, and an iron wheel or disc, the periphery of which is divided into as many segments as there are electro-magnets in each circle, is made to revolve between the circles of stationary electro-magnets and coils for the purpose of generating electric currents.

My invention consists, secondly, in improvements in the apparatus for regulating the approach of the carbons used for producing the electric light as they are consumed by the current. In this improvement the carbons are made to approach and to separate from each other by means of a right and left handed screw, connected with the carbon holders. Each of the screws, with its carbon holder, can be actuated independently of the other.

My invention consists, thirdly, in apparatus for directing and projecting the electric light upon distant objects. In this improvement the light is condensed into a single beam by means of a holophote, or a parabolic reflector mounted on a platform, on which is also placed the regulator above described. The whole apparatus retains whatever position is given to it both horizontally and vertically without the use of any locking movement.

A.D. 1873, February 19.—No. 619.

FINDLAY, DAVID BUCHAN, of Liverpool, in the county of Lancaster.—“Improvements in apparatus for raising sunken ships and other submerged bodies.”

The features of novelty which constitute this invention consist in a novel method of raising submerged bodies. In carrying the invention into practice, a suitable lighter or floating medium is placed over the submerged body to be lifted. Across the lighter are placed balks of timber projecting over the lighter at each side. Upon the balks and outside the lighter are placed blocks or crossheads, and between these blocks or crossheads and the balks are placed hydraulic rams or jack screws. The lifting chains being attached to the submerged body, the ends are passed up through the balks and blocks through an opening provided for that purpose. The chains are then stoppered by a toggel on the top of the block or crosshead, and the rams or lifting power put into operation. When the blocks are lifted, a toggel is placed through the link of the chain, just over the balk. The blocks are then lowered, a toggel again inserted through the chain above the block and the process of lifting repeated. By this method raising chains can be flected link by link, or as required.

A.D. 1873, February 19.—No. 625.

SANDERS, FRANCIS, of Birmingham, in the county of Warwick, attorney and solicitor.—(*A communication from Richard David Sanders, of Bombay, in the Empire of British India, engineer.*)—“Improvements in communicating or signalling on railway trains, and in warming railway carriages.”

According to this invention for the purpose of communicating or signalling on railway trains, a receiver containing condensed air is fixed under the tender of the engine, the condensing air pump of which is worked by the engine or by hand. In communication with this receiver is a hollow cylinder, having within it a disc or piston smaller than the cylinder. A rod from the disc passes through the cylinder, and is connected to the lever of a steam whistle or other alarm. The top of the hollow cylinder is in communication with a pipe running under the carriages, branch pipes therefrom passing to the compartments of the carriages, and being furnished with stopcocks. When the apparatus is in its normal condition the disc or piston in the cylinder is balanced; but if by accident the train is divided and the pipe under the carriages is ruptured, there is a free passage of the condensed air from the ruptured pipe. The pressure of the air in the receiver being no longer counterbalanced, the said air rushes through the cylinder and raises the disc therein, which opens the stopcock of the steam whistle or alarm, and the said whistle or alarm is brought into action. The same operation takes place when a passenger opens one of the stopcocks in the carriages. In the latter case the compartment from which the signal is made is indicated by a flag, which is blown by the escaping air from a tube passing out laterally from the carriage.

To adapt this invention to the warming of railway carriages, the condensed air is passed through a coil of pipes in the smoke box of the engine, and the pipe under the carriages is connected with shallow boxes which form a portion of the floor of the carriages and act as foot warmers, the heat arising from them also warming the carriages.

A.D. 1873, February 20.—No. 630.

GOODWIN, WILLIAM, of Buxton, in the county of Derby, coach builder.—“Improvements in two-wheeled carriages.”

“Hansom cabs” and similar vehicles are constructed with a portable driver’s seat, and so as to admit of the vehicle being readily balanced with the driver’s seat, either fixed or removed. The front end of each side spring is connected to a slide, and the hind stay where it is connected at each side of the body is rendered capable of moving horizontally so as to balance the vehicle.

Secondly. The front ends of the shafts can be raised or lowered for different sized horses by jointing the stay to which the hinder ends of the shafts are fixed and lengthening or shortening the stays for supporting the shafts by means of a regulating nut.

Thirdly. “Hansom cabs” with a leather head to turn down can be formed into open vehicles by making the side windows to slide into the body of the front windows to fold and turn down into receptacles in each side of the same.

A.D. 1873, February 20.—No. 644.

FAREY, BARNARD WILLIAM, of the firm of Bryan, Donkin, and Company, of Bermondsey, in the county of Surrey.—“Improvements in the valve gear of steam and other motive power engines.”

In compound engines in which the steam or elastic fluid working the engine passes in succession into two or more cylinders, I couple the slide valve of the first or high pressure cylinder with the slide valve of the second or low pressure cylinder by means of a rod which passes from one valve to the other within the passage which conveys the steam (or fluid) from one cylinder to the other. The rod catches hold of the high pressure cylinder slide valve on the exhaust or under side, and on the low pressure cylinder slide valve on the top. The arrangement is similar where more than two cylinders are employed.

A.D. 1873, February 20.—No. 649.

BROUGHTON, FREDERICK, of 3, Hanover Cottages, Regent’s Park, in the county of Middlesex, and STEPHENS, ROBERT, and BRADLEY, GUSSE ALFRED, both of No. 18, Green Street, Paddington, in said county of Middlesex.—“An improved mode of locking railway signals and points.”

Fixing the various shunting points of side and cross rails by means of a series of rods and cranks connected and controlled by levers in the signal box. Also acting in conjunction with and securing the signals and semaphore to prevent accidents on railways.

A.D. 1873, February 21.—No. 663.

COLLIER, ELLIS, of Rochdale, in the county of Lancaster.—“Improved apparatus to be applied to domestic fire places for economizing fuel.”

This invention is applicable to kitchen ranges and other domestic fire places and consists principally of a false back, either perforated or otherwise, which is so arranged that it can be either drawn forward bodily in a vertical or nearly vertical position, or it can be drawn forward only at the bottom into an inclined position so as to fill up a greater part of the bottom of the grate and leave the whole top its usual width if required for boiling, or if the top of the fire be not required, it may be drawn forward at the top, only so as to reduce the top and leave the bottom part the usual depth.

A.D. 1873, February 24.—No. 687.

MORGAN-BROWN, WILLIAM, of the firm of Brandon and Morgan-Brown, engineers and patent agents, of 38, Southampton Buildings, London, and 13, Rue Gaillon, Paris.—(*A communication from Louis Giacomini, of Treviso, Italy.*)—“Improvements in the art of carding woollen and cotton tissues, and in the machinery for that purpose.”

This invention describes a compound carding cylinder for replacing the ordinary teazles composed of vegetable fibres, mixed with metallic wires, and also an additional cylinder composed also of vegetable fibres for the purpose of cleaning the teazle cylinder when teazles are employed.

A.D. 1873, February 24.—No. 689.

SMITH, EDMUND, of Rochdale, in the county of Lancaster, engineer, and BRIERLEY, WILLIAM, of the same place, brass founder & finisher.—“Improvements in water gauges for steam boilers, and in arrangements for discharging air from boilers, pipes, and other vessels connected therewith.”

1. It relates to glass tube water gauges, and consists of an arrangement of two glass tubes in branches from a vertical metal tube, with only one set of taps for both glass tubes.

2. It relates to means for discharging air from boilers, pipes, and other vessels; and consists in a pipe having a seating at one end, which allows air to pass a fixed valve when the pipe is cold, but when heated by the passing or entering steam the pipe expands and brings its seating against the fixed valve and thus closes the outlet.

A.D. 1873, March 18.—No. 999.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from Charles Luxton, of Hudson city, county of Hudson, and state of New Jersey, United States of America.*)—"Improvements in peat machines."

The machine consists in a double series of knives and circular cutters with spiral conveyors for feeding and discharging, all carried on a revolving shaft enclosed in a cylindrical casing; also in a stationary bed and a trap or box for receiving stones and other foreign substances with a door for clearing the same.

A.D. 1873, April 7.—No. 1283.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from John Henry Mooney and Charles Cook Comstock, both of Providence, Rhode Island, United States of America.*)—"Improvements in sewing machines."

The said invention comprehends one or more diagonal wrist cranks and swivel jointed sleeve combined therewith for converting a rotary into a rectilinear movement. The combination with such device for converting a rotary into a rectilinear movement of a simple crank on its equivalent to give movement to the feeding device. The combination of the device above mentioned for converting a rotary into a rectilinear movement with the shuttle carrier. The combination with the slide bar of a feeding device of a sewing machine of a piston acting to compress a spring inclosed in a protecting case, and the combination of the needle-bar and presser foot bar with a let off arm, whereby the quantity of thread to be given off for each movement of the needle bar is proportioned to the thickness of the cloth to be sewed.

A.D. 1873, June 6.—No. 2020.

FRANK, PETER, of Bloomsbury, in the county of Middlesex.—(*A communication from George Lee Eason, of Guelph, Ontario, Canada West.*)—"Improvements in watch case springs and in fasteners for the same."

This consists of springs with notches cut therein in combination with a fastener capable of being adjusted on the spring and secured thereon at any particular part by a screw.

A.D. 1873, August 13.—No. 2686.

HAMMOND, HENRY WOODCROFT, of 27, Southampton Buildings, Chancery Lane, in the county of Middlesex, civil engineer.—(*A communication from Philip Syng Justice, of the city and county of Philadelphia, in the state of Pennsylvania, United States of America.*)—"Improvements in the mode of and apparatus for driving piles by means of explosive substances."

A gunpowder pile driver, the framework of which can be made of either wood or wrought or cast iron in a form not materially differing from other pile drivers, its height varying from 30 to 50 feet as may be required by the length of the piles to be driven. The inner sides of the frame are provided with strong iron bars or rails which act as guides to the hammer or monkey and the cylinder or mortar. At the back or side of said monkey is constructed a friction rod for controlling its movements, being regulated by means of a lever. Between the bars or rails, and fitted to and embracing them by its arm is a heavy cast iron cylinder or mortar like a short cannon, slightly recessed on the lower end to receive the head of the pile, while on its upper end there is a bore or chamber, varying in depth and diameter according to the weight or size of the machine. The monkey or hammer of cast iron or steel, which is fitted to the guides immediately above the cylinder or mortar has a piston or plunger projecting from its lower end, which is made to fit closely in the bore or chamber of the cylinder or mortar by means of a steel expansion ring or obturation which surrounds the end of the plunger as a packing. The upper end of the hammer or monkey is bored out to receive a piston head, which is fitted on the cross bar on top of the frame, so as to act as a buffer or air cushion to prevent the too upward movement of the hammer or monkey when the charge is too heavy.

The machine is worked by dropping a percussive charge into the chamber of the cylinder or mortar, when by means of the aforesaid mentioned lever the friction rod releases its hold on the hammer or monkey, which

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in its descent forces the plunger air tight into the chamber of the cylinder or monkey, thereby compressing the air contained therein with such a force as to ignite the percussive charge, the explosion of which not only forces down the pile but throws up the hammer or monkey to its former position in the guides where it is again caught by the friction and held suspended till the next charge of percussion powder is employed. The said hammer or monkey can be made to rise and fall at the rate of from 30 to 50 times per minute, and the pile will be driven down almost without intermission.

A.D. 1873, August 13.—No. 2689.

EDWARDS, EDMUND, of the firm of Edwards and Co., 38, Southampton Buildings, Chancery Lane, in the county of Middlesex, engineers and patent agents.—(*A communication from Ezra Miller, of the city and state of New York, United States of America.*)—"Improvements in the construction and arrangement of platform forms, couplings, and buffers for railroad cars."

The objects of this invention are, first, to prevent the crushing of the platforms of railroad cars, in the event of collision between trains, by arranging the buffer beam and its supporting timbers in a horizontal plane with the bed of the car body, and employing, in conjunction with such elevated platform, a system of trussed braces, which are so applied as to tie the platform timbers firmly to the car bed, and also sustain them against upward or downward strain. Also to prevent injurious jerks and concussions of the cars in starting or stopping, by means of centrally arranged spring compression buffers and couplers, so that when the cars are coupled together, the heads of the buffers are all brought forcibly in contact with each other.

Second. To form the couplings between railway cars by means of horizontal coupling hooks having bevilled coupling ends, acute angle coupling faces and vertical sides, one hook being arranged at each end of each car, so that the hook on one car will couple with the corresponding hook on any other car, while they prevent to a great degree lateral vibration of the cars, and form a safe and positive connection so long as the cars remain upright. Also to allow a free automatic coupling of the hooks, but to prevent their casual detachment by means of side stops or abutments in connection with the laterally vibrating coupling hooks; and to construct the rear end of each coupling hook, so as to receive a spring box, so arranged as to allow the hook to receive all the lateral vibration required.

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 Donath, F. A. H., 407, Cigars.
 Donisthorpe, R. F., 108, Crimping hair.
 Donoghue, J. D. O', 2420 (*App. 3.*) Tooth brushes.
 Donoghue, W. O', 2420 (*App. 3.*) Tooth brushes.
 Douds, D., 2649 (*App. 6.*) Steam pumps.
 Dougall, A. Mc, 542, Treating stable manure.
 Dougall, J. Mc, 393, Manure.
 Dougherty, W., 932 (*App. 37.*) Casting metals.
 Doury, P., 89,—Waterwheels.
 Drummond, D., 6, Casting metals.
 Du Bois, C., 1250 (*App. 40.*) Elevating apparatus.
 Du Motay, C. M. T., 328, Baryta.
 Dubreuil, V., 410, Lubricating.
 Ducomet, J., 2377 (*App. 2.*) Nets.
 Duffee, E., 1575 (*App. 44.*) Gas.
 Duke, H., 366, Axles and axle boxes.
 Duncan, G., 383, Printing.
 Dunderdale, W. J., 531, Tables.
 Dunn, T. W., 420, Extracting impurities from wool.
 Dupuch, G. J., 33, Water gauges.

E.

Early, J., 432, Enumerating passengers in carriages.
 Eason, G. L., 2020 (*App. 7.*) Watch-case springs and
 fasteners.
 Eaton, R., 26, Grinding corn.
 Eayrs, W. P., 2354 (*App. 2.*) Rotary engines.
 Edgcome, T. L. B., 1645 (*App. 4.*) Fettling furnaces.
 Edwards, E., 541, Rock boring and other engines;
 2689 (*App. 7.*) Railway carriages.
 Edwards, G. W. B., 243, Manure drills.
 Edwards, J. C., 373, Preparing and cleaning cotton,
 &c.
 Eickemeyer, R., 76, Hats; 487, Hats.
 Eley, W. T., 369, Cartridge cases.
 Elmslie, E. W., 211, Opening cases, boxes and cans.
 Elmsley, R., 251, Railway signals.
 Emmens, S. H., 526, Railways; 576, Heating and
 lighting; 2108 (*App. 51.*) Signals.
 Ermen, G., 533, Fire grates.
 Erskine, F., 192, Gully traps; 312, Steam-boilers.
 Evans, W. N., 14, Tanning.
 Evans, W. R., 2261 (*App. 1.*) Fire-arms.

F.

Fairbairn, R., 260, Washing fibres.
 Fairbairn, Sir W., 270, Steam-boilers.
 Fairclough, H., 350, Separating flour from mid-
 dlings, &c.
 Fairclough, J., 350, Separating flour from mid-
 dlings, &c.
 Farey, B. W., 644 (*App. 7.*) Valve gear of engines.
 Farrow, C., 218, Bottle stoppers.
 Fawcett, T., 159, Governors.

- Bonneville, H. A., 174, Spinning; 310, Artificial stone; 486, Presses; 1148 (*App.* 39.) Presses; 1348 (*App.* 42.) Ammunition, &c.; 1572 (*App.* 44.) Piling textile fabrics; 2010 (*App.* 49.) Covering surfaces with wood; 2092 (*App.* 50.) Ship-building; 2342 (*App.* 2.) Fluid meters.
- Boothroyd, B., 250, Painting venetian blinds, &c.
- Borlase, E., 269, Washing ores.
- Bottomley, W., 167, Weaving.
- Boucherville, G. B. de, 2583 (*App.* 5.) Propelling ships.
- Bouju, M. R., 2416 (*App.* 3.) Pulp engines.
- Boundy, C., 17, Recovering zinc, &c.
- Bousfield, G. T., 980 (*App.* 38.) Cheese; 2023 (*App.* 49.) Locks; 2641 (*App.* 6.) Sewing-machines.
- Bowden, J., 399, Salt.
- Bowker, W., 3, Weaving.
- Bowra, M. E., 228, Elastic fabrics.
- Boynton, L. W., 98, Centrifugal machines and kilns.
- Bradley, G. A., 649 (*App.* 7.) Locking railway signals and points.
- Braithwaite, J. C., 348, Weaving carpets.
- Bremerkamp, C., 61, Treating osier rods, &c.
- Bride, T. Mc, 579, Gold and silver cord.
- Bridges, W. G., 551, Removing and preventing incrustation in boilers.
- Brierley, W., 689 (*App.* 7.) Water gauges, discharging air from boilers, &c.
- Briggs, J., 494, Sizing and dressing machines.
- Brimley, C., 235, Reaping machines.
- Broad, J., 515, Applying poultices.
- Broel, J., 385, Air-gas.
- Brook, J., 415, Carpets.
- Brooks, J. W., 822 (*App.* 36.) Boots and shoes.
- Broomhead, G., 320, Wire.
- Brotherhood, P., 287, Propelling machinery.
- Broughton, F., 649 (*App.* 7.) Locking railway signals and points.
- Broughton, J., 256, Fire-arms.
- Brown, G., 426, Horse shoes.
- Brown, R., 447, Stop valves and taps.
- Brown, W., 524, Ploughs.
- Brown, W. M., 612 (*App.* 7.) Weaving; 687 (*App.* 7.) Carding engines; 822 (*App.* 36.) Boots and shoes; 1233 (*App.* 40.) Granulators; 1901 (*App.* 48.) Hydraulic hose.
- Browne, J. C., 277, Propelling vessels.
- Bruneaux, L., 1644 (*App.* 45.) Hydro-caloric meters.
- Brunel-Bodin, L., 375, Blocking boots.
- Brunel-Marchand, I. F., 375, Blocking boots.
- Buckley, S. (Hyde), 44, Pipe wrenches and cutters.
- Buckley, S. (Oldham), 430, Charging and drawing retorts.
- Bull, T., 280, Washing machines.
- Bullock, A., 171, Preventing incrustation in steam-boilers.
- Bunster, C. E. W., 15, Aërial tramways.
- Buquoy, X., 2393 (*App.* 2.) Dredging machines.
- Burdon, W., 257, Steam vacuum pumps.
- Burfitt, C., 538, Removing and preventing incrustation in steam-boilers.
- Burgess, J., 307, Crochet needle handles.
- Burt, J. U., 57, Carriages.
- Burton, P., 47, Railway carriages.
- Büttgenbach, F., 560, Blast furnaces.
- Büttner, F. L. A., 412, Tubular boilers.
- C.
- Cameron, J. A., 381, Presses.
- Campbell, H., 513, Manure.
- Campion, W. (Nottingham), 517, Turning the welts of knitted and looped fabrics.
- Campion, W. (Saxifox), 517, Turning the welts of knitted and looped fabrics.
- Canning, Sir S., 120, Ships' telegraphic apparatus.
- Capewell, G. J., 64, Nail extractors.
- Cardon-Wamain, J. T., jun., 203, Fibres.
- Cardozo, H. G., 492, Horse shoes.
- Carmichael, H., 72, Bleaching, dyeing and washing.
- Carr, D. A., 344, Railway signals.
- Carr, G. W., 521, Automatic regulating valves.
- Carrington, W. T. H., 156, Fire-places; 427, Preventing the slipping of boxes or carriages used in wire-rope transport.
- Carty, B. F. Mc, 681 (*App.* 35.) Economizing fuel.
- Cathcart, J. L., 431, Screw propellers.
- Caton, J. B., 401, Pipe and cigar lighters.
- Cederholm, H. S., 1394 (*App.* 42.) Ships' logs.
- Chadwick, T. H., 430, Charging and drawing retorts.
- Chambers, R., 418, Cleaning wheat and other grain.
- Chanel, C., 614 (*App.* 6.) Fuel.
- Chantrell, G. F., 499, Storing, cleansing and removing house refuse, &c.
- Chapman, E. R., 434, Sewing-machines.
- Chapman, L., 2281 (*App.* 1.) Rotary pumps.
- Chappell, A., 555, Carding engines.
- Charlesworth, G., 114, Weaving.
- Charlsworth, J., 555, Carding engines.
- Cheetham, J., 475, Combing machines.
- Chislett, J. R., 87, Medical electricity.
- Chodzko, N. F. B. de, 124, Steam-boilers.
- Clark, A., 278, Metallic revolving shutters.
- Clark, A. M., 109, Condensing liquefiable matters; 189, Velocipedes; 237, Railway switches and points; 320, Wire; 355, Sifting shovels; 368, Artificial stone; 397, Ticketing shop goods, &c.; 433, Lining straw board, &c.; 490, Railway signals; 501, Sewing-machines; 606 (*App.* 7.) Governors; 999 (*App.* 7.) Peat machines; 1241 (*App.* 3.) Presses; 1428 (*App.* 4.) Fruit preserving cans, &c.; 2012 (*App.* 49.) Stone cutters; 2190 (*App.* 52.) Printing oil-cloth, &c.; 2420 (*App.* 3.) Tooth brushes.
- Clark, E., 611 (*App.* 34.) Raising and lowering ships.
- Clark, G., 286, Metallic and other vessels.
- Clark, J., 361, Railway breaks.
- Clark, W., 2583 (*App.* 5.) Propelling ships.
- Clarke, T. A. W., 108, Crimping hair.
- Clayton, H. O., 13, Cart saddles.
- Clayton, G., 148, Miners' safety lamps.
- Clean, F. Mc, 41, Raising ships.
- Clure, W. B. Mc, 13, Cart saddles.
- Cochrane, H., 1187 (*App.* 40.) Knives and forks.
- Cocker, J., 1084 (*App.* 1.) Spinning.
- Cockshott, R., 567, Oil or lubricant.
- Codd, H., 75, Bottles; 221, Tramways.
- Coignet, Son and Co., 305, Manure.
- Cole, F., 110, Air-engines.
- Colfs-Heyne, J. F., 425, Kilns.
- Collier, E., 663 (*App.* 7.) Domestic fire-places.
- Collins, C. U., 462, Lock and latch furniture.

Comstock, C. C., 1283 (*App. 7.*) Sewing-machines.
Conder, E., 32, Mechanical motive-power.
Cook, W., 408, Suspended wheels.
Cookerly, M., 459, Hoes.
Cooper, J., 16, Casting metals.
Corliss, S. G., 300, Clothes wringers.
Coubro, T. P., 185, Ships' sails.
Coulter, J., 159, Governors.
Cowan, J., 500, Heating greenhouses and other buildings.
Cowles, E., 99, Cooling candle moulds.
Cowper, E. A., 131, Sewing boots and shoes.
Cox, J., 214, Extracting and recovering oils, fats, &c.
Cox, S., 214, Extracting and recovering oils, fats, &c.
Cox, S. F., 273, Leather.
Coxeter, J., 302, Administering nitrous oxide gas.
Craven, T. C., 22, Ginning cotton.
Crispin, W. H., 122, Furnaces.
Croll, A. A., 45, Distilling liquors, &c.
Cumming, J., 267, Feeding paper to printing and other machines.
Curtis, F., 769 (*App. 36.*) Paper-making; 1924 (*App. 48.*) Steam-boilers and engines; 2238 (*App. 52.*) Sewing boots and shoes; 2389 (*App. 2.*) Cutting precious stones.
Cutter, J. M., 1646 (*App. 45.*) Valves.

D.

Daelen, R., 562, Iron and steel.
Daelen, V., 484, Wheel tyres, hoops and rings.
Darling, W., 572, Cleaning and trimming the teeth of wheels and racks.
Davies, R. V., 210, Water waste preventers.
Davis, C., 353, Preventing ships foundering; 354, Saving life and property at sea.
Davis, G., 162, Ships' davits.
Davis, J., 2353 (*App. 2.*) Tanning.
De Boucherville, G. B., 2583 (*App. 5.*) Propelling ships.
De Chodzko, N. F. B., 124, Steam-boilers.
De Kercado, G. T., 104, Water meters.
De Labarre, E., 321, Combinations of textile threads.
De Rutenberg, Baron V., 360, Explosive compounds.
De Ware, A. A., 304, Umbrella and parasol frames.
Deacon, H., 505, Chlorine.
Dean, G. W., 355, Sifting shovels.
Dean, S., 259, Dressing mill-stones.
Dean, W., 442, Gas regulators.
Debenham, A., 502, Undershirts, flannel and other waistcoats.
Decastro, D., 12, Wet gas meters.
Defcher, A. A., 311, Shaping and ornamenting butter and pastry.
Delessert, H. E., 157, Carriages.
Demailly, G., 591 (*App. 7.*) Filters; 1644 (*App. 45.*) Hydro-caloric motors.
Den Bergh, J. Van, 8, Harness.
Denby, W. S., 192, Gully traps; 312, Steam-boilers.
Dennis, W., 301, Fire extinguishers, &c.
Dennison, J. T., 530, Fire-places, flues and grates.
Deplechin, J. B., 409, Water meter and other cocks.
Deregnacourt, A., 103, Boots and shoes.
Derham, T. S., 411, Kilns.
Dick, W. B., 362, Extinguishing fires.

Dietz, R. E., 319, Self-setting animal traps.
Digney, J. D., 247, Railway signals.
Digney, T. S., 247, Railway signals.
Dixon, C., 464, Stoning raisins.
Dixon, J., 222, Bridges and viaducts.
Dodge, J. M., 516, Adjusting screw propellers and rudders.
Dodge, T. A., 1901 (*App. 48.*) Hydraulic hose.
Dolby, T. G. F., 449, Saving life at sea.
Donath, F. A. H., 407, Cigars.
Donisthorpe, R. F., 108, Crimping hair.
Donoghue, J. D. O', 2420 (*App. 3.*) Tooth brushes.
Donoghue, W. O', 2420 (*App. 3.*) Tooth brushes.
Douds, D., 2649 (*App. 6.*) Steam pumps.
Dougall, A. Mc, 542, Treating stable manure.
Dougall, J. Mc, 393, Manure.
Dougherty, W., 932 (*App. 37.*) Casting metals.
Doury, P., 89, —Waterwheels.
Drummond, D., 6, Casting metals.
Du Bois, C., 1250 (*App. 40.*) Elevating apparatus.
Du Motay, C. M. T., 328, Baryta.
Dubreuil, V., 410, Lubricating.
Ducomet, J., 2377 (*App. 2.*) Nets.
Duffee, E., 1575 (*App. 44.*) Gas.
Duke, H., 366, Axles and axle boxes.
Duncan, G., 383, Printing.
Dunderdale, W. J., 531, Tables.
Dunn, T. W., 420, Extracting impurities from wool.
Dupuch, G. J., 33, Water gauges.

E.

Early, J., 432, Enumerating passengers in carriages.
Eason, G. L., 2020 (*App. 7.*) Watch-case springs and fasteners.
Eaton, R., 26, Grinding corn.
Eayrs, W. P., 2354 (*App. 2.*) Rotary engines.
Edgcome, T. L. B., 1645 (*App. 4.*) Fetting furnaces.
Edwards, E., 541, Rock boring and other engines; 2689 (*App. 7.*) Railway carriages.
Edwards, G. W. B., 243, Manure drills.
Edwards, J. C., 373, Preparing and cleaning cotton, &c.
Eickemeyer, R., 76, Hats; 487, Hats.
Eley, W. T., 369, Cartridge cases.
Elmslie, E. W., 211, Opening cases, boxes and cans.
Elmsley, R., 251, Railway signals.
Emmens, S. H., 526, Railways; 576, Heating and lighting; 2108 (*App. 51.*) Signals.
Ermen, G., 533, Fire grates.
Erskine, F., 192, Gully traps; 312, Steam-boilers.
Evans, W. N., 14, Tanning.
Evans, W. R., 2261 (*App. 1.*) Fire-arms.

F.

Fairbairn, R., 260, Washing fibres.
Fairbairn, Sir W., 270, Steam-boilers.
Fairclough, H., 350, Separating flour from middlings, &c.
Fairclough, J., 350, Separating flour from middlings, &c.
Farey, B. W., 644 (*App. 7.*) Valve gear of engines.
Farrow, C., 218, Bottle stoppers.
Fawcett, T., 159, Governors.

Fawcett, T. C., 471, Brick making.
 Fay, W. C., 1101 (*App.* 39.) Fibres.
 Feather, S., 265, Fire-places.
 Fennelly, R., 245, Aërial tramways.
 Fenn, A. G., 56, Signals.
 Field, C. M., 2389 (*App.* 2.) Cutting precious stones.
 Findlay, D. B., 619 (*App.* 7.) Raising submerged bodies.
 Fisher, R. A., 2435 (*App.* 3.) Preserving iron and steel.
 Fisk, F., 1584 (*App.* 44.) Printing telegraphs.
 Fiskien, D., 497, Steam plough porters.
 Fletcher, W., 457, Propelling tramway carriages, forcing water, &c.
 Flinsch, F., 446, Packing tobacco, &c.; 461, Distributing color upon continuous lengths of paper, &c.
 Folk, J. E., 19, Dies.
 Forest, H., 247, Railway signals.
 Forrest, H. E., 610 (*App.* 34.) Turning axles.
 Foster, B. H., 252, Steam and other engines.
 Foster, W., 384, Spinning.
 Foulis, W., 59, Charging and drawing retorts.
 Fowler, H., 77, Hospital beds.
 Fox, H. B., 390, Waterproof garments.
 Frank, P., 2020 (*App.* 7.) Watch-case springs and fasteners.
 Freeman, H. O., 980 (*App.* 38.) Cheese.
 Frier, J., 381, Presses.
 Fuller, T., 161, Billiard cues.
 Fullicks, A. T., 477, Pavements, platforms, stairs, &c.

G.

Gall, C., 392, Furnaces.
 Garau and Co., 441, Railway electrical breaks.
 Gardiner, P. G., 37, Springs.
 Gardner, R. W., 606 (*App.* 7.) Governors.
 Garon, F., 62, Stoves.
 Garth, R. F., 145, Treating hides, cotton waste and seeds.
 Gascoyne, W., 498, D traps.
 Gaume, C., 2618 (*App.* 6.) Electro-magnetic engines.
 Gay, P., 95, Excavating minerals.
 Gedge, W. E., 104, Water meters; 202, Cocks and vent pegs; 295, clocks; 375, Blocking boots; 403, Converting a slow alternate circular motion into a rapid continuous circular motion.
 Gense, C., 130, Mattresses.
 Gercke, K. L. H., 548, Cartridges.
 George, C., 224, Barometers.
 Giacomini, L., 687 (*App.* 7.) Carding engines.
 Gibbs, G., 284, Fire-arms.
 Gibbs, H. H., 330, Driving straps and bands.
 Gibson, G., 289, Governors.
 Gibson, R. H., 119, Desks and seats.
 Gilbee, W. A., 564, Nets.
 Gilchrist, W., 507, Bricks, tiles, &c.
 Gillespie, J., 1062 (*App.* 38.) Bungs and bung inserters.
 Gillespie, W. H., 559, Tramway carriage breaks.
 Girdwood, R., 314, Gas burners.
 Glen, G., 176, Railway and tramway rolling stock.
 Goddu, L., 1313 (*App.* 41.) Monitors.
 Goodrich, G. W., 90, Puddling furnaces.

Goodrich, L. S., 90, Puddling furnaces.
 Goodwin, C. R., 501, Sewing machines.
 Goodwin, W., 630 (*App.* 7.) Two-wheeled carriages.
 Gordon, J., 10, Envelopes.
 Goueslain, A., 202, Cocks and vent pegs.
 Gould, S. L., 769 (*App.* 36.) Paper-making.
 Graham, J. C., 13, Cart saddles.
 Gratton, T., 466, Railway wheels and tires.
 Gray, R. B., 1233 (*App.* 40.) Granulators.
 Greenwood, G., 568, Heating rooms and buildings.
 Grey, E., 276, Microscopes.
 Grieve, T. W., 294, Theatre stages.
 Griffith, J., 2170 (*App.* 52.) Steam-boilers.
 Grigg, W., 786 (*App.* 36.) Applying electricity to cattle.
 Grindrod, J. T., 391, Raising and floating vessels, &c.
 Griswold, L., 2176 (*App.* 52.) Sewing-machines.
 Grout, W. H. J., 463, Carriage wheels.
 Grout, W. L., 465, Combination tool.
 Guattari, A., 453, Pneumatic telegraphs.
 Guernsey, J. W., 1352 (*App.* 42.) Shearing animals.
 Guerriero, A., Comte de St. Ange, 2184 (*App.* 52.) Horse-shoes.
 Gumpel, C. G., 9, Lowering ships' boats.
 Gutensohn, A., 258, Obtaining salt of tin and products from waste or refuse tin plate.

H.

Haas, B., jun., 2231 (*App.* 52.) Dial indicators for carriages.
 Hadfield, R., 1787 (*App.* 46.) Wheels, axles, shafts.
 Hadwen, J. W., 417, Mordanting, dyeing and printing; 470, Spinning.
 Haggett, W., 1461 (*App.* 43.) Metals.
 Haight, H. J., 966 (*App.* 38.) Artists' scrapers.
 Hale, E., 264, Rolling metals.
 Halcy, S., 323, Treating hides and skins.
 Haley, S. H., 323, Treating hides and skins.
 Halfpenny, G. W., 262, Ink, incombustible paper, envelopes and books.
 Hall, J. H., 26, Grinding corn.
 Hambruch, G., 416, Railway carriages.
 Hamilton, E. C., 187, Manure.
 Hamilton, J. B., 387, Organ reed pipes.
 Hammond, H. W., 2686 (*App.* 7.) Gunpowder pile driver.
 Hampton, T., 842 (*App.* 37.) Armour plates.
 Hannart, L., 397, Ticketing shop goods, &c.
 Harding, G. E., 2064 (*App.* 50.) Furnaces.
 Harlow, B., 480, Stench traps and grids.
 Harmer, T., 335, Cleaning glass roofs.
 Harris, W. R., 419, Shuttle tops.
 Harrison, B., 32, Mechanical motive-power.
 Harrison, C., 121, Umbrellas, parasols and sun-shades.
 Harrison, C. W., 1, Air-gas; 435, Air-gas; 528, Obtaining oxygen.
 Harrison, W. W., 577, Knives and forks.
 Hart, G. W., 315, Steam-boilers.
 Hartley, R., 81, Singeing yarn.
 Hartsuff, J. H., 2649 (*App.* 6.) Steam pumps.
 Harwood, I. K., 967 (*App.* 38.) Pumps.

Haseltine, G., 13, cart saddles; 77, Hospital beds; 126, Projectiles; 128, Rolling metals; 213, White lead; 233, Washers; 259, Dressing mill-stones; 303, Hinges; 326, Converting cast iron into steel; 351 Torpedo launches; 459 Hoes; 516, Adjusting screw propellers and rudders; 681 (*App. 35.*) Economizing fuel; 806 (*App. 36.*) Lamps; 932 (*App. 37.*) Casting metals; 967 (*App. 38.*) Pumps; 1250 (*App. 40.*) Elevating apparatus; 1352 (*App. 42.*) Shearing animals; 1517 (*App. 44.*) Railway carriage-couplings; 1622 (*App. 45.*) Paper bags; 1641 (*App. 45.*) Separating liquids and substances; 2064 (*App. 50.*) Furnaces; 2212 (*App. 52.*) Sewing-machines; 2255 (*App. 1.*) Valves; 2257 (*App. 1.*) Inhaling apparatus; 2270 (*App. 1.*) Railway watering columns; 2284 (*App. 1.*) Weaving; 2287 (*App. 1.*) Reaping and mowing; 2311 (*App. 1.*) Distilling turpentine; 2353 (*App. 2.*) Tanning; 2354 (*App. 2.*) Rotary engines; 2600 (*App. 5.*) Preparing and packing water colors.

Hatfull, R., 281, Preventing and removing incrustation in steam-boilers.

Hawkins, J. G., 220, Gas.

Haycock, S. H., 126, Projectiles.

Hayek, —, 310, Artificial stone.

Hays, J. J., 437, Centrifugal hydro-extracting apparatus.

Hays, W. B., 437, Centrifugal hydro-extracting apparatus.

Hayward, W. F., 2050 (*App. 6.*) Iron safes and fastenings.

Heaton, R. G., 388, Fishing reels.

Hedges, K. W., 436, Steam-boilers and engines.

Hemingway, J., 297, Railway keys and wedges.

Henderson, A. C., 591 (*App. 7.*) Filters; 1644 (*App. 45.*) Hydro-caloric motors; 1645 (*App. 4.*) Fetting furnaces.

Henley, T. F., 212, Meat extract.

Henley, W. T., 254, Puddling furnaces.

Henry, M., 33, Water gauges.

Henson, H. H., 191, Shaping and punching iron.

Herrick, S. K., 2185 (*App. 52.*) Sewing-machines.

Hersey, C. H., 1233 (*App. 40.*) Granulators.

Hersey, F. C., 1233 (*App. 40.*) Granulators.

Hewett, S. B., 1793 (*App. 46.*) Fire-places.

Heyne, J. F. C., 425, Kilns.

Heyworth, E., 1890 (*App. 48.*) Steam-boilers.

Hidden, T. B., 2600 (*App. 5.*) Preparing and packing water colors.

Highton, H., 85, Electric telegraphs; 545, Electric telegraphs.

Hill, J., 583 (*App. 6.*) Stove grates.

Hillmann, J. H., 90, Puddling furnaces.

Hindley, G., 178, Dressing stone.

Hinds, E. C., 282, Preventing accidents on railway platforms.

Hipkins, E., 165, Iron safes.

Hitchcock, R., 356, Lamps.

Hodges, S. H., 1380 (*App. 42.*) Boots and shoes.

Hodson, H. F., 93, Agricultural and horticultural implements.

Holding, J., 419, Shuttle tips.

Hollingworth, J., 1464 (*App. 43.*) Weaving.

Holman, S., 115, Gas retort mouthpieces, lids and fasteners; 136, Raising and lowering gas purifier lids, &c.

Holmes, J. E., 98, Centrifugal machines and kilns.

Holt, T. M., 531, Tables.

Hookham, G., 240, Metallic box fastenings.

Hookham, H. J., jun., 240, Metallic box fastenings.

Hopkinson, J. T., 181, window fasteners.

Horner, G., 188, Spinning.

Horsley, T., jun., 204, Closing cartridge cases.

Hosking, J., 343, Safety valves.

Howard, E. I., 2255 (*App. 1.*) Valves.

Howe, W. H. I., 1428 (*App. 4.*) Fruit preserving cans, &c.

Howlett, E. J., 1622 (*App. 45.*) Paper bags.

Huch, E. H., 288, Soup farina.

Hugall, C. E., 177, Window fasteners.

Hughes, E. T., 63, Towing canal boats; 321, Combinations of textile threads.

Hughes, P., 96, Dishes and plates.

Hunt, B., 40, Printing telegraphs; 425, Kilns.

Hunt, S., 142, Building blocks.

Hunter, C. D., 2257 (*App. 1.*) Inhaling apparatus.

Huntington, F. A., 1753 (*App. 46.*) Steam boilers and furnaces.

Hutchings, A. J. H., 588 (*App. 3.*) Pickling.

Hutchinson, J., 1464 (*App. 43.*) Weaving.

Hutchison, D., 551, Removing and preventing incrustation in boilers.

Huxtable, J., 363, Turn-wrest ploughs.

I.

Ibbetson, J., 378, Leather.

Imray, J., 309, Steam-boilers; 325, Heating, evaporating, distilling, &c.

Intyre, P. Mc, 424, Sharpening chisels, &c.

Ireland, W., 263, Wheel tyres.

J.

Jackson, W., 338, Heating feed water.

Jacobsen, F., 266, Manure.

James, J. H., 456, Ornamenting fabrics.

Janney, E. H., 1517 (*App. 44.*) Railway carriage-couplings.

Jarman, H., 164, Steering ships.

Jasper, C. E. F., 407, Cigars.

Jaynor, A., 66, Steering and hoisting.

Jeffs, J., 527, Ironing and glazing textile fabrics, paper, &c.

Jelley, R. S. C., 271, Cutting tenons.

Jensen, P., 149, Printing telegraphs; 2650 (*App. 6.*) Railroad rails.

Jewitt, H., 55, Toys.

John, W. H. St., 2527 (*App. 4.*) Purifying gas.

Johnson, A. F., 371, Fire alarm and water supply apparatus.

Johnson, J. H., 18, Spinning; 43, Transmitting power; 155, Fire-arms; 247, Railway signals; 305, Manure; 319, Self-setting animal traps; 356, Lamps; 405, Liquid fuel; 406, Tin foil; 443, Combined pencil and eraser; 521, Automatic regulating valves; 522, Lawn mowers; 557, Nut blanks; 1234 (*App. 40.*) Steam-engines; 1947 (*App. 48.*) Speed indicators; 2061 (*App. 50.*) Casting metals.

Johnson, J. O., 2342 (*App. 2.*) Fluid meters.
Johnston, J. B., 2650 (*App. 6.*) Railroad rails.
Johnstone, J., 524, Ploughs.
Jones, D., 372, Forcing inflammable fluid and liquid into furnaces.
Jones, E., 386, Cartridges.
Jones, F. L., 298, Weaving.
Jones, H., 187, Manure.
Jones, J. S., 283, Basting meat.
Jones, R., 451, Safety lamps.
Jones, R. C., 271, Cutting tenons.
Jones, S. B., 261, Railway carriages and platforms.
Jones, W., 118, Valves.
Joseph, J., 440, Brooches and bouquet holders.
Joslin, W., 341, Furnaces.
Justice, P. S., 2686 (*App. 7.*) Gunpowder pile driver.

K.

Kalmar, A., 5, Compasses.
Kay, T. B., 379, Carding engines.
Kenyon, J., 482, Drying yarns and fabrics.
Kenyon, J. H., 482, Drying yarns and fabrics.
Kercado, G. T. de, 104, Water meters.
Kershaw, H., 549, Spinning.
Kesterton, H., 53, Rolling metals; 54, Metal telegraph posts; 253 Steam-boilers.
Kidd, J., 520, Heating steam-boilers.
King, J., 467, Railway platforms; 468, Repairing propeller shafts at sea.
King, J. A., 116, Peat-fuel.
King, J. M., 467, Railway platforms; 468, Repairing propeller shafts at sea.
King, T. D. M., 467, Railway platforms; 468, Repairing propeller shafts at sea.
Kininmonth, J., 102, Bakers' ovens.
Kirkham, G. B., 444, Treadle motions.
Kirkman, J., 200, Governors.
Kitson, G. L., 521, Automatic regulating valves.
Knaggs, W., 488, Fire-places.
Knevet, A., 438, Fire grates.
Knight, E., 806 (*App. 36.*) Lamps.
Knight, J., 234, Umbrellas, parasols and sunshades.
Knowles, M., 105, Weaving.
Kolb, A., 316 Ventilating closets, &c.
Konn, S. W., 91, Electrical heat.
Krausse, H., 80, Air-gas.
Kreb, F., 1584 (*App. 44.*) Printing telegraphs.
Kux, A., 422, Steam-boilers.

L.

Laak, L. Van, 1062 (*App. 38.*) Bungs and bung inserters.
Labarre, E. de, 321, Combinations of textile threads.
Lacon, W. S., 186, Lowering ships' boats.
Lafargue, A., 458, Oil-gas.
Lake, W. R., 26, Grinding corn; 27, Cleaning horses; 79, Thread spools; 80, Air-gas; 127, Pipe-joints, elbows or couplings; 225, Fireproof vaults; 226, Fireproof safes; 227, Boots and shoes; 279, Railway breaks; 290, Refrigerating; 300, Clothes wringers; 317, Break-

Lake, W. R.—cont.

waters; 371, Fire alarm and water supply apparatus; 396, Treating middlings; 441, Railway electrical breaks; 452, Valves; 454, Valves; 473, Heating steam-boilers; 540, Sewing sails, tents, tarpaulins, awnings, &c.; 558, Drilling and boring; 560, Blast furnaces; 1283 (*App. 7.*) Sewing-machines; 1737 (*App. 46.*) Veneers; 1770 (*App. 1.*) Traction-engines.
Lamb, J. G., 340, Spinning.
Lamb, J. W., 73, Knitting machines.
Lancaster, R., 442, Gas regulators.
Lanier, G. P., 130, Mattresses.
Larmann, F. W., 2481 (*App. 4.*) Tuyeres.
Lartigue, H., 247, Railway signals; 490, Railway signals.
Larue, J., 172, Printing.
Latham, B., 331, Manure.
Laurette, L., 368, Artificial stone.
Law, J., 71, Carding-engines.
Law, S., 71, Carding-engines.
Lawrence, C., 510, Washing and cleansing clothes, &c.
Lawrence, F. L., 510, Washing and cleansing clothes, &c.
Laycock, T., 1078 (*App. 39.*) Sewing-machines.
Lea, W., jun., 566, Roller blind movements or furniture.
Leach, G., 357, Preparing and carding wool; 358, Sea fishing; 359, Preparing wool.
Leatham, W., 30, Valves.
Lee, H., 2287 (*App. 1.*) Reaping and mowing.
Lee, H. M., 493, Preserving ferns, plants, and grasses.
Lee, J. H., 594 (*App. 34.*) Steam-boilers and engines.
Lee, R. B., 190, Metal telegraph posts.
Leech, W., 2567 (*App. 5.*) Preserving wood from the ravages of insects.
Leeming, T., 46, Bronzing and coloring paper, &c.
Leigh, J. S., 15, Aërial tramways.
Leon, W. F., 2057 (*App. 50.*) Hydraulic hoists.
Levy, G. S., 433, Lining straw board, &c.
Lewis, D., 494, Sizing and dressing machines.
Lewis, H., 322, Boots and shoes.
Lewis, J., 575, Fire grates and ovens.
Lloyd, R., 2311 (*App. 1.*) Distilling turpentine.
Lobdell, G. G., 2061 (*App. 50.*) Casting metals.
Lodighin, A. N., 91, Electrical heat.
Longworth, T., 298, Weaving.
Loo-Wauters, F. Van, 63, Towing canal boats.
Loryea, A. M., 217, Hydraulic motive-power.
Lowe, O., 36, Steam-boilers.
Lowe, S., 73, Knitting machines.
Luxton, C., 999 (*App. 7.*) Peat machines.
Lynde, F. G., 46, Bronzing and coloring paper, &c.
Lyne, T., 380, Moulding bricks.
Lyon, R., 523, Railway communicating apparatus.
Lyttle, W. A., 52, Roofs, floors and pavements; 158, Railway chairs.

M.

McBride, T., 579, Gold and silver cord.
McCarty, B. F., 681 (*App. 35.*) Economizing fuel.
McClean, F., 41, Raising ships.

McClure, W. B., 13, Cart-saddles.
McDougall, A., 542, Treating stable manure.
McDougall, J., 393, Manure.
McIntyre, P., 424, Sharpening chisels, &c.
McWilliams, A. S., 2005 (*App. 49.*) Sheep shears.
Macaulay, H., 92, Fire-arms.
Mackie, S. J., 445, Explosive compounds.
Macneill, Sir J., 206, Tramways and carriages.
Macneill, R., 184, Pavements.
Maitre, E., 2010 (*App. 49.*) Covering surfaces with wood.
Malpas, W., 2567 (*App. 5.*) Preserving wood from the ravages of insects.
Mamelzer, T., 397, Ticketing shop goods, &c.
Manbré, A., 2, Valves.
Maquay, S. W., 450, Gas retorts; 511, Manure.
Marchand, I. F. B., 375, Blocking boots.
Markham, R. J., 345, Wheels.
Marquez, P., 317, Breakwaters.
Marsters, S., 536, Cooling beer and other liquids.
Martin, B. G., 486, Presses; 1148 (*App. 39.*) Presses.
Martin, C., 174, Spinning.
Martin, S. B., 290, Refrigerating.
Marval, H. C., 398, Fire-arms; 413, Fire-arms.
Mason, F. H., 681 (*App. 35.*) Economizing fuel.
Masourine, M. S., 207, Caissons.
Masson, J. B. F., 406, Tin foil.
Mathelin, P. L., 409, Water meter and other cocks.
Matthews, C., 264, Rolling metals.
Matthews, W. J., 138, Fire-arms.
Mayers, H., 2057 (*App. 50.*) Hydraulic hoists.
Meakin, G. F. L., 1179 (*App. 49.*) Hanging sashes and shutters.
Mellor, W., 546, Smoothing and pressing textile fabrics.
Mellor, W. W., 132, Cutting glass.
Metge, E., 710 (*App. 6.*) Preserving meat.
Mewburn, J. C., 409, Water meter and other cocks; 410, Lubricating.
Meylert, A. P., 213, White lead.
Michaud, P. F., 629 (*App. 34.*) Axle-boxes.
Michelet, J. C., 403, Converting a slow alternate circular motion into a rapid continuous motion.
Mickle, W., 803 (*App. 36.*) Smelting and puddling iron; 921 (*App. 37.*) Economizing fuel; 1656 (*App. 45.*) Economizing fuel.
Middlehurst, James, 346, Potato and other root gatherers, &c.
Middlehurst, John, 346, Potato and other root gatherers, &c.
Middlemass, J., 306, Clerical costumes.
Milburn, J., 483, Chimney cowl.
Miller, E., 2689 (*App. 7.*) Railway carriages.
Miller, S. H., 19, Dies.
Miller, T. W., 571, Fire-arms.
Mills, B. J. B., 431, Screw propellers.
Mills, F., 379, Carding engines.
Mills, J. H., 1924 (*App. 48.*) Steam-boilers and engines.
Mills, J. L., 123, Printing.
Milner, E., 196, Lubricating.
Mirfield, M., 423, Combing fibres.
Molyneux, E. L., 2600 (*App. 5.*) Preparing and packing water colors.
Monkhouse, T. S., 123, Printing.
Moody, C., 2023 (*App. 49.*) Locks.
Mooney, J. H., 1283 (*App. 7.*) Sewing-machines.

Moorhouse, J., 574, Fire ranges.
Morand, A., 411, Kilns.
Morgan-Brown, W., 612 (*App. 7.*) Weaving; 687 (*App. 7.*) Carding engines; 822 (*App. 36.*) Boots and shoes; 1233 (*App. 40.*) Granulators; 1901 (*App. 48.*) Hydraulic hose.
Morris, E. R., 29, Chartometers.
Morris, T. S., 394, Furniture casters.
Morton, J., 568, Heating rooms and buildings.
Motay, C. M. T. du, 328, Baryta.
Muirhead, L. P., 244, Speed indicators.
Murdoch, H. H., 360, Explosive compounds.
Myers, A. G., 127, Pipe-joints, elbows or couplings.
Myers, S., 512, Stove grates.

N.

Nangle, W. C., 495, Paints.
Napier, J., 246, Excavating under water.
Naylor, M., 167, Weaving.
Needham, J., 31, Fire-arms and cartridges.
Negley, J. S., 431, Screw propellers.
Neil, W., 2067 (*App. 50.*) Distilling spirituous liquors.
Neill, J., 377, Forming sugar into blocks.
Newcomb, W., 967 (*App. 38.*) Pumps.
Newell, L. D., 503, Ships' berths and sofas.
Newell, W., 514, Ornamenting tin-plate articles.
Newton, A. V., 20, Paper-ruling machines; 257 Steam vacuum pumps; 444, Treadle motions; 553, Extension ladders.
Newton, W. E., 19, Dies; 28, Musical instruments; 89, Waterwheels; 90, Puddling furnaces; 256, Fire-arms; 340, Spinning.
Nichols, F. W., 303, Hinges.
Nichols, J., 215, Ventilating waterclosets, &c.
Noad, J., 539, Sulphurated lead.
Norman, J., 135, Clipping animals.
Norris, J., 504, Mathematical drawing instruments.

O.

O'Donoghue, J. D., 2420 (*App. 3.*) Tooth brushes.
O'Donoghue, W., 2420 (*App. 3.*) Tooth brushes.
Oldknow, J., 24, Lace-making.
Olds, P. F., 681 (*App. 35.*) Economizing fuel.
Olley, G., 338, Heating feed water.
Olsen, C. H. G., 149, Printing telegraphs.
Onderdonk, J. P., 1622 (*App. 45.*) Paper bags.
Osborn, S., 313, Forging metals.
Osborne, D. T., 198, Self feeding air-tight stoves.
Osborne, J. W., 1947 (*App. 48.*) Speed indicators.
Ostrander, J., 557, Nut blanks.
Owen, C., 534, Communicating in trains.
Owen, J., 160, Mine shafts and hoists.
Owen, W., 583 (*App. 6.*) Stove grates.

P.

Paddison, H., 193, Breakwaters, docks, piers, &c.
Page, R. W., 107, Cutting screws.
Paget, F. A., 5, Compasses.
Pagliara, G., 405, Liquid fuel.

Palmer, F. A., 2618 (*App. 6.*) Electro-magnetic engines.
 Palmer, R., 198, Self feeding air-tight stoves.
 Parker, A. J., 535, Printing.
 Parker-Rhodes, C. E., 173, Illuminating clocks, names, signs, &c.
 Parkyn, J., 396, Treating middlings.
 Parlour, J. T., 25, Cabs and other vehicles; 144, Wheels for carriages.
 Parratt, G. F., 469, Life rafts.
 Pasquier, A., 295, Clocks.
 Passmore, E. G., 522, Lawn mowers.
 Paterson, J., jun., 365, Steam traps.
 Patison, J., 569, Gas, fuel, oil, &c.
 Patterson, R. H., 274, Purifying coal gas.
 Peacock, G., 364, Chain cables.
 Pearl, O., 18, Spinning.
 Pearson, W., 121, Umbrellas, parasols and sun-shades.
 Peebles, D. B., 7, Gas regulators.
 Pelouze, E. P., 109, Condensing liquefiable matters.
 Pengilly, C., 563, Filters.
 Perkins, C. H., 128, Rolling metals.
 Perman, C. H., 194, Metallic boxes.
 Petersen, C., 1394 (*App. 42.*) Ships' logs.
 Pettifer, C., 395, Ventilating mines, buildings, drains, ships, &c.
 Philippi, F., 11, Smelling bottles.
 Picq, H., 43, Transmitting power.
 Pilling, W., 480, Stench traps and grids.
 Pink, R., 263, Wheel tyres.
 Pinker, J., 481, Lowering and raising ships' boats.
 Pitcher, W., 146, Crapng hair, &c.
 Pitt, R., 273, Leather.
 Pitt, T., 284, Fire-arms.
 Platt, G., 389, Ornamenting gas fittings, &c.
 Platt, J., 156, Fire-places.
 Plessner, J. M., 180, Lamps.
 Poage, J. N., 2270 (*App. 1.*) Railway watering columns.
 Pohl, O. E., 4, Salt.
 Pope, F. L., 1641 (*App. 45.*) Separating liquids and substances.
 Porter, B., 201, Weaving.
 Porter, H., 224, Barometers.
 Potter, H. T., 340, Spinning.
 Power, H. L., 152, Umbrellas.
 Prangle, O., 420, Extracting impurities from wool.
 Pratt, W. T. C., 150, Steering ships.
 Preece, W. H., 153, Railway signals.
 Preston, W. R., 187, Manure.
 Prince, A., 446, Packing tobacco, &c.; 461, Distributing color upon continuous lengths of paper, &c.
 Pringle, C., 594 (*App. 34.*) Steam-boilers and engines.
 Pritchard, G., 106, Metal tubes and bars.
 Procopé, M., 564, Nets.
 Prouse, R. S., 366, Axles and axle boxes.
 Prud'homme, P. D., 490, Railway signals.
 Puckle, H. J., 245, Aërial tramways.
 Purdie, J., 233, Washers.

Q.

Quelch, W. B., 141, Heating and ventilating buildings.

Quimbel, G., 309, Steam-boilers.
 Quin, J., 580 (*App. 7.*) India rubber valves.
 Quintavalle, R., 150, Steering ships.

R.

Rainbow, W., 297, Railway keys and wedges.
 Ramsden, J. C., 519, Utilizing furnace gases.
 Randolph, A., 470, Spinning.
 Rawle, G., 14, Tanning.
 Ray, R., 46, Bronzing and coloring paper, &c.
 Reynolds, C. T., 2600 (*App. 5.*) Preparing and packing water colors.
 Reckendorfer, J., 443, Combined pencil and eraser.
 Redgrave, J., 223, Glass vessels.
 Reed, J. H., 1052 (*App. 38.*) Pegging boots and shoes.
 Reynolds, J., 489, Guiding railway engines and carriages.
 Reynolds, J. H., 489, Guiding railway engines and carriages.
 Rhodes, C. E. P., 173, Illuminating clocks, names, signs, &c.
 Rhodes, J. H., 382, Liqueur stands.
 Rich, A., 2600 (*App. 5.*) Preparing and packing water colors.
 Richards, W., 518, Charging and drawing retorts.
 Richardson, J., 370, Furnaces.
 Richardson, L., 2600 (*App. 5.*) Preparing and packing water colors.
 Riley, E., 254, Puddling furnaces.
 Rippin, E. C., 2108 (*App. 51.*) Signals.
 Ritchell, C. F., 558, Drilling and boring.
 Roberts, L., 94, Railway rails.
 Robertson, James, 448, Motive-power and blowing engines.
 Robertson, John, 248, Forcing, exhausting and measuring air, gas, &c.
 Robey, J., 230, Purifying, disinfecting and deodorizing.
 Robinson, W., 67, Signals.
 Rochussen, T. A., 562, Iron and steel.
 Roddis, J., 460, Chimney cowl.
 Rogé, H. N., 237, Railway switches and points.
 Rogers, H., 129, Carriages.
 Rogers, J. B., 491, Signals.
 Rogers, S. A., 190, Metal telegraph posts.
 Rolin, E., 605 (*App. 5.*) Weighing machines.
 Rosa, W. V. V., 356, Lamps.
 Rose, H. C., 255, Horse shoes.
 Rose, W. W., 55, Toys.
 Rosenfield, A., 2057 (*App. 50.*) Hydraulic hoists.
 Ross, J., 2238 (*App. 52.*) Sewing boots and shoes.
 Ross, L. E., 2284 (*App. 1.*) Weaving.
 Roturier, J., 101, Turning the leaves of music books.
 Rowland, T. F., 1287 (*App. 41.*) Gas retorts.
 Roy, J., 400, Umbrellas and parasols.
 Rutenberg, Baron V. de, 360, Explosive compounds.
 Rydill, G., 82, Drying-machines; 229, Dyeing, staining and drying animal and vegetable substances, &c.; 329, Steam-boilers, furnaces, motive-power, &c.; 376, Economizing fuel, heating feed water, &c.
 Rylands, J., 817 (*App. 4.*) Straightening, measuring and cutting wire and metal rods.
 Ryle, J., jun., 2332 (*App. 2.*) Refrigerators.

S.

J., 509, Corks.
 P., 147, Gas, oil-gas engines and boilers.
 P., 1944 (*App.* 48.) Fire-arms.
 W., 596 (*App.* 7.) Heating feed water.
 F., 625 (*App.* 7.) Communicating in trains
 warming railway carriages.
 R. D., 625 (*App.* 7.) Communicating in
 and warming railway carriages.
 ., 2504 (*App.* 4.) Spreading silk.
 I., 568, Heating rooms and buildings.
 A. F., 217, Hydraulic motive-power.
 W. H., 1641 (*App.* 45.) Separating liquids
 substances.
 ker, C., 661 (*App.* 34.) Shearing animals.
 —, Bart., 310, Artificial stone.
 ger, W. J., 464, Stoning raisins; 465, Com-
 on tool.
 H., 88, Marking timber, &c.
 s, A. T. C., 84, Trusses for hernia.
 l, J., 546, Smoothing and pressing textile
 s.
 ld, R., 170, Brick making.
 , L., 2218 (*App.* 52.) Economizing fuel.
 enbach, V., 208, Gilding on glass.
 G. W., 1815 (*App.* 47.) Preserving food.
 l. Y. D., 154, Treating sewage; 183, Purify-
 al gas; 296, Manure; 570, Manure.
 mes, 554, Combing fibres.
 ohn, 423, Combing fibres.
 ., 138, Fire-arms.
 . B., 349, Dressing stone.
 H., 79, Thread spools.
 d, A., 103, Boots and shoes.
 D. J., 197, Paper making.
 R., 572, Cleaning and trimming the teeth of
 and racks.
 J., 199, Water supplying.
 l., 238, Railway rolling stock.
 . P., 429, Steel.
 . (Hull), Heating.
 . (Newcastle), 597 (*App.* 2.) Punching and
 ng.
 ., 1298 (*App.* 41.) Printing.
 ., 473, Heating steam-boilers; 2641 (*App.*
 wing-machines.
 ., 1101 (*App.* 39.) Fibres.
 l, W. H., 554, Combing fibres.
 ., 525, Atmospheric hammers.
 orth, J., 1078 (*App.* 39.) Sewing-machines.
 W. T., 508, Preventing the overwinding of
 kips.
 y, J. M., 356, Lamps.
 . M., 334, Lighting and heating.
 l., 412, Tubular boilers.
 C., 479, Exhibiting advertisements.
 G., 394, Furniture casters.
 H., 27, Cleaning horses.
 . H., 23, Crushing stone, &c.
 ., 1079 (*App.* 39.) Railways.
 ., 689 (*App.* 7.) Water gauges, discharging
 n boilers, &c.
 ., 70, Ventilating boots and shoes.
 l., 324, Infants' feeding bottles.
 J., 351 Torpedo launches.

Smith, J. Y., 279, Railway breaks.
 Smith, S., 352, Indicating and checking number
 of passengers, amounts of fares, attendances of
 workmen, &c.
 Smith, T. J., 124, Steam-boilers; 328, Baryta.
 Smith, W. B., 133, Sewing machines.
 Snoeck, A., 321, Combinations of textile threads.
 Sokolnicki, J., 336, Lamps.
 Soul, M. A., 101, Turning the leaves of music
 books.
 Sowerbutts, A., 100, Raising ships.
 Spence, P., 50, Treating waste liquors in alum
 works.
 Sprague, W., 1770 (*App.* 1.) Traction-engines.
 St. Ange, Comte de, 2184 (*App.* 52.) Horse shoes.
 St. John, W. H., 2527 (*App.* 4.) Purifying gas.
 Stacy, G., 2012 (*App.* 49.) Stone cutters.
 Starley, J., 133, Sewing machines.
 Stead, J., 249, Rotatory engines.
 Stead, T., 291, Washing and wringing machines.
 Stebins, T., 2057 (*App.* 50.) Hydraulic hoists.
 Steinhoff, G., 88, Marking timber, &c.
 Stell, S., 111, Consuming smoke and saving fuel.
 Stephens, L. A., 97, Bottles and corks.
 Stephens, R., 649 (*App.* 7.) Locking railway signal
 and points.
 Stephens, W. B., 35, Paints.
 Sterling, W. H., 2022 (*App.* 49.) Preserving iron.
 Stevens, L., 216, Carbonic oxide.
 Stidder, J. G., 236, Water waste preventers.
 Stirling, J., 374, Railway breaks.
 Stone, J., 496, Furnace flues.
 Stone, T., 231, Carding engines.
 Stoney, F. G. M., 550, Sluices or stop valves.
 Storry, A., 478, Rivetting boots and shoes.
 Strange, L., 381, Presses.
 Stroudley, W., 6, Casting metals.
 Stuart, D., 155, Fire-arms.
 Stuart, T. E., 2354 (*App.* 2.) Rotary engines.
 Sudlow, W. E., 272, Steam-engines.
 Sutcliffe, W., 148, Miners' safety lamps.
 Suzanne, P. A. L., 140, Imitation school slates, tab-
 lets, &c.

T.

Taft, J., 373, Preparing and cleaning cotton, &c.
 Talcott, C. Mc K., 414, Screws.
 Target, J. L. F., 168, Treating sewage.
 Tasker, H., 472, Hay and straw elevators.
 Taylor, J., 430, Charging and drawing retorts.
 Taylor, J. F., 1241, Presses.
 Taylor, W., 482, Drying yarns and fabrics.
 Tesse, P., 490, Railway signals.
 Tesseyman, J., 2255 (*App.* 1.) Valves.
 Tester, J., 299, Cutting vegetable substances.
 Theaker, H., 313, Forging metals.
 Thomas, M., 507, Bricks, tiles, &c.
 Thomas, S. T., 612 (*App.* 7.) Weaving.
 Thompson, W. G., 42, Extracting oleaginous matters.
 Thorneloe, J., 402, Organs and harmoniums.
 Thwaites, R., 97, Bottles and corks.
 Ticozzi and Co., 441, Railway electrical breaks.
 Tiffany, J. C., 798 (*App.* 36.) Oil-gas.
 Todd, R., 348, Weaving carpets.
 Tongue, J. G., 140, Imitation school slates, tablets,
 &c.

Touaillon, C., 2184 (*App. 52.*) Horse-shoes.
 Toulson, J. A. H., 335, Cleaning glass roofs.
 Townsend, W. H., 2190 (*App. 52.*) Printing oil-cloths, &c.
 Trippe, F. J., 134, Cutting textile fabrics.
 Turner, G., 60, Venetian blinds.
 Turton, T., 169, Hydraulic propellers.
 Turton, W., 129, Carriages.
 Twynam, C. H., 285, Railway signals.

U.

Uda, M., 553, Extension ladders.
 Uda, M. B. S., 553, Extension ladders.
 Ulery, W. G., 1234 (*App. 40.*) Steam-engines.
 Ullmann, S., 112, Trousers and suspenders.
 Umbers, E., 56, Signals.
 Unsworth, T., 195, Doubling machines.

V.

Van Den Bergh, J., 8, Harness.
 Van Laak, L., 1062 (*App. 38.*) Bungs and bung inserters.
 Van Loo-Wauters, F., 63, Towing canal boats.
 Vandermeersch, A. H., 155, Fire-arms.
 Vaughan, E. P. H., 297, Railway keys and wedges; 661 (*App. 34.*) Shearing animals; 2481 (*App. 4.*) Tuyeres.
 Viault, J., 543, Railway signals.
 Vincent, W., 565, Fuel.
 Vowell, J., 289, Governors.
 Vuibert, F. N. C., 710 (*App. 6.*) Preserving meat.

W.

Waddington, H., 293, Miners' safety lamps.
 Walker, A., jun., 58, Steam-boilers.
 Waller, I., 77, Hospital beds.
 Walpole, J., 125, Double furrow ploughs.
 Walton, W., 337, Rolling and drawing wire.
 Wamain, J. T. C., jun., 203, Fibres.
 Ware, A. A. de, 304, Umbrella and parasol frames.
 Warner, J. W., 225, Fireproof vaults; 226, Fireproof safes.
 Warth, A., 1572 (*App. 44.*) Piling textile fabrics.
 Watson, A., 137, Combined thrashing machine and elevator.
 Watson, John, 275, Tramway points.
 Watson, Joseph, 370, Furnaces.
 Wattles, J. W., 166, Spinning.
 Wauters, F. Van L., 63, Towing canal boats.
 Webb, A. E., 728 (*App. 46.*) Candles and night-lights.
 Weber, J. H., 400, Umbrellas and parasols.
 Weber, L., 1270 (*App. 41.*) Galvanic batteries.
 Weekes, C., 209, Fire lighters.
 Weisker, B., 2092 (*App. 50.*) Ship-building.
 Welch, E. B., 40, Printing telegraphs.

Welch, E. J. C., 51, Safety valves.
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Clark (*Luxton*), 999 (*App.* 7.)**Fulling and felting ; felted fabrics :**Wilson (*Eickemeyer*), 76.
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Nangle, 495.

Furnaces (miscellaneous) :Croll, 45.
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4. Index of Subject-matter to Chronological and Descriptive Index from January 1 to February 15, 1873, and to Appendixes from February 16 to August 15, 1873.

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CHRONOLOGICAL AND DESCRIPTIVE INDEX
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CONTAINING THE

ABRIDGMENTS OF PROVISIONAL AND COMPLETE SPECIFICATIONS

Delivered from February 16 to February 22, 1873.

A.D. 1873, February 17.—No. 580.

QUIN, JAMES, of Leyland, near Preston, in the county of Lancaster.—“Improvements in the manufacture of india rubber valves.”

The defect hitherto existing in valves of this description has been that the valve in opening bends at the point where the two kinds of rubber are united, and hence there was a tendency to break or separate the two pieces at the joint, and it is to remedy this defect that my invention is designed.

The invention consists principally in making the hard rubber centre or hinge piece with a thin tongue or flange projecting from its outer edge in or about the centre of its thickness, which tongue or flange is let into a groove in the inner edge of the soft rubber, and thus not only strengthens the joint but prevents the valve from bending at the point of junction with the hard rubber, and thus obviates the liability of the two parts to come asunder at this point.

A.D. 1873, February 17.—No. 581.

VERRIER, ALFRED BULT, of Bridport, in the county of Dorset.—“Improvements in the means or apparatus for warming rooms or buildings.”

This invention chiefly consists of certain arrangements of air passages and chambers so situated with regard to domestic fire places, stoves, and kitchen ranges, that the air which enters and travels through the said passages and chambers becomes heated therein, and this heated air is then allowed to issue into the room or building so as to assist in warming the same. The invention includes a fire box placed in a hot air chamber at the back of the fire place: also a metal or fire clay box situated on the hearth and projecting beyond the grate, the heat and gases from the fire being led through this box which thus becomes heated and warms the room by radiation; also constructing “register stoves” with the grate projecting into the room, that is to say, entirely in front of the ordinary front plate of the stove instead of being almost immediately under the chimney.

A.D. 1873, February 17.—No. 582.

BARKER, ABRAHAM, of Rochdale, in the county of Lancaster, plumber, &c.—“Improvements in clog irons and machinery for making the same.”

My improvement is to place iron or other metals within the interior of the present clog irons, so as to remedy the defect of the wearing part or parts.

Also an apparatus termed an oliver, which has attached to it two hammers for forging and flattening the parts and bending them.

A.D. 1873, February 17.—No. 583.

OWEN, WILLIAM, of Rotherham, ironfounder, and HILL, JOHN, of No. 1, Westfield Terrace, Rotherham, in the county of York, manager of an iron foundry.—“Improvements in stove grates and in appliances connected therewith for absorbing and diffusing heat.”

This relates to the construction of movable or hinged cast iron canopies to stoves, such canopies having fins or gills or rays cast on them for absorbing the heat from the fire, and thus warming the air coming in contact with it externally, whereby the heat becomes diffused and is utilized for warming the apartment.

A.D. 1873, February 17.—No. 584.

RITCHIE, WILLIAM, of the city and county of Edinburgh, North Britain, engineer and machinist.—“Improvements in screw presses.”

This invention consists in forming bevelled edged clutches on the underside of the eye and upper collar or head of the lever and main screw, respectively, of screw presses, both fitting each other, when the lever

is pressed down by a spiral spring secured above it by a screw pin, or a nut and pin, to the stem of the screw passing up through the eye of the lever; all so that the lever will turn the screw and screw down the press (as usual) until the upward strain exerted, by thus turning on the bevelled edges of the coupling catches, is greater than the power of the spring, when the lever and its catches rise out of those on the screw, and swivel round loosely without further turning it or straining the press so as to break it; the spring being made and set to yield at two or three times the strain required for the work of the press, leaving a wide margin between this and the breaking strain of the press.

A.D. 1873, February 17.—No. 585.

GREENWOOD, WILLIAM, of Keighley, in the county of York, machinery agent and engineer.—“Improved machines for sweeping streets and highways.”

An axle and wheels are used, upon and from which axle is swung a tank or receiver for the dirt or debris. One of the said wheels is constructed with a broad flange, and within the flange are a number of dishes or concavities into which the dirt is swept by means of a brush working at an angle to the said receptacles, a guide being applied to further direct the dirt to the said receptacles.

The dirt is carried by the said receptacles and is discharged over and into a trough leading to the tank. This apparatus is drawn by horse or other power.

A.D. 1873, February 17.—No. 586.

HALMSHAW, DAVID, of Park Works, Halifax, in the county of York, machine maker.—“Improvements in the construction and arrangement of fire-places or ranges, ovens, and boilers for domestic use, for radiating heat and economizing fuel.”

The fire place or grate is made to project forward beyond the oven and boiler in ordinary kitchen ranges, and also in room fire-places, and the projecting sides and bottom, and also a portion of the front of such fire-place or grate are perforated, the remainder of the front having bars arranged in the usual manner. The back of the said fire-place may also be perforated, and the distance from back to front varied according to circumstances.

In adapting my improvements to fire places or ranges in present use, I apply a perforated plate in front of the bars with another plate not perforated extending backward, and covering over the old fire place, which plate may be used as a receptacle for coals, or by forming a flue through the old back, this plate may be used as a hot hearth, by which arrangement smoke is consumed (the new fire range with its projecting perforated sides and bottom being fixed in front of the said perforated back). The oven and boiler are to be made of wrought iron welded, and the boiler to be tinned inside.

A.D. 1873, February 17.—No. 587.

CATTELL, THOMAS, of Clarendon House, No. 25, Clarendon Square, in the county of Middlesex, M.D.—“Improved methods for purifying gutta percha.”

By this invention crude gutta percha is deprived of its impurities by treating it by—

Process No. 1. The solutions of gutta percha, made according to Specification No. 446, in the year of our Lord 1859, are filtered or strained, and the gutta percha recovered by means of alcohols, vapor of alcohols, or steam.

Process No. 2. Crude gutta percha, is softened by the action of solvents, hot water, or steam, and mechanically strained, and the solvents afterwards removed and recovered by means of steam.

Process No. 3. Crude gutta percha is softened by a mixture of the usual solvents of gutta percha with alcohols, and mechanically strained, and any solvent adhering to the gutta percha drawn off by steam and collected.

Process No. 4. Gutta percha, obtained by what is termed in the said Specification, No. 449, “the process of congelation,” is broken up and passed into a chamber, where it meets either the vapour of alcohols or steam, and the solvents of the gutta percha, or the alcohols used are collected.

A.D. 1873, February 17.—No. 588.

HUTCHINGS, ANNETTA JANE HONOR, of Numbers 2 and 3, Quay Head, in the city and county of Bristol, widow.—“Improvements in spicing and preparing malt or distilled vinegar, rendering the same better suited for pickling purposes.”

The inventor takes malt or distilled vinegar, chilis, cloves, ginger, pimento, mace, and nutmeg, all or

some, and 1st, grinds and commingles together the spices; and 2nd, places the ground spice in an earthen or other vessel with perforations in the bottom, which vessel is placed in another earthen or other vessel. Both vessels are placed in a boiler, the vinegar being poured into the inner vessel upon the spices, and the contents of the boiler being kept simmering for a sufficient time, the strength of the spices is drawn out into the second vessel, and upon being filtered is fit for bottling.

A.D. 1873, February 17.—No. 589.

CARMICHAEL, WALTER SCOTT, of Edinburgh, in Scotland.—“Improvements in the construction of ships and vessels.”

This invention consists in having a sloping roof, or part of one, rising from the surface of the water or near it, round more or less of the steamer or other vessel, on which the waves may gradually lose their force, as on the slope of a breakwater, instead of rushing against perpendicular sides, and perhaps sweeping the deck; also in having a clear passage above that roof for the more furious waves to pass from windward to leeward, and likewise in having a small deck above that open space—also in having, for the purpose of securing the propulsion of the vessel with advantage, a tube or tubes extended from stem to stern, within or immediately behind which the propeller may rotate.

A.D. 1873, February 17.—No. 590.

BODMER LOUIS, RUDOLPH, of 2, Lansdowne Road, Notting Hill, in the county of Middlesex.—“Improvements in the manufacture of artificial stone and bricks, and in the machinery and apparatus connected therewith, which improvements either wholly or partially are applicable for preparing and for compressing clay, coal, and other substances or compounds.”

This invention mainly refers to improvements in Patents to Bodmer, No. 1504, A.D. 1864, and No. 1499, A.D. 1869, and relates to the preparation and mixing of the materials, the construction of the presses, and to hydraulic accumulators used in connection therewith.

A.D. 1873, February 18.—No. 591.

HENDERSON, ARTHUR CHARLES, of the firm of Henderson and Company, British and Foreign patent agents, of No. 31, Charing Cross, in the county of Middlesex.—(*A communication from Gustave Demailly, civil engineer, of the city of Brussels, and Kingdom of Belgium.*)—“Improvements in the purification of water and apparatus connected therewith, together with the mode of cleansing the same.”

This invention consists in purifying water before use either in domestic or industrial purposes by a combined chemical and mechanical process, freeing it from calcarious and other matters held in solution, by adding thereto a small proportionate quantity of solution of caustic lime, which troubling the water presents a precipitate formed by the action of the carbonic acid by immediately depositing carbonate of lime, so that instead of having to treat matters in solution it merely remains to operate on matters in suspension.

The apparatus for effecting this consists of a filter formed of a cylindrical vertical case of sheet or cast iron furnished with a lid, in this another cylinder is contained which is the filter proper, also formed of sheets of cast or sheet iron, one at the top and the other at the bottom, and united by three concentric cylinders of perforated sheet iron, these cylinders form two annular capacities supplied with filtering matter composed of felt or wool rendered imputrescible.

The water arrives in the filter by a tap, spreads itself between the envelope and the filtering cylinder, then by pressure it traverses the latter, and makes its exit by a discharge tap perfectly clear and freed from all matters in suspension.

The cleansing of the filter is effected, without the necessity of taking the apparatus to pieces, in the following manner, when the steam engine is stopped, the tap admitting water into the filter is closed, as well as the exit pipe communicating with the feed pump which allows of free communication with the central pipe of the filter, and water draught of the generator.

On opening the discharge tap it will at once be seen what has taken place. The pressure of the generator sends the water already purified into the central pipe of the filter, this water traverses inversely the beds or layers of filtering matter and draws along with it the foreign organic matter arrested during filtration, and flows out by the discharge tap.

The whole cylindrical body is also movable on a pivot, and is made to revolve so that it comes under the influence of a brush fixed vertically at the inner side of the case, which suffices to dislodge any residue,

A.D. 1873, February 18.—No. 592.

MARSLAND, EDWARD, of Baguley, in the county of Chester.—“An improvement in the manufacture of rollers for agricultural and other purposes.”

My invention applies to the manufacture of rollers such as are used for rolling land for agricultural purposes, and is also equally applicable to garden rollers and to rollers used for road making and other similar uses, and the invention consists in making the cylinders of such rollers in one solid piece of wrought iron without a joint, either by bending a plate of suitable size into a cylinder and welding the edges together into a solid mass, or by rolling the cylinder at once in a single piece in a manner similar to that practiced in making railway tires.

A.D. 1873, February 18.—No. 593.

STARKIE, JAMES, of Preston, in the county of Lancaster, wire worker.—“Improved apparatus for economising fuel for domestic or other purposes.”

This invention is simple, and its novelty consists in carrying a constant current of air into the back of the fire, thus forcing the heat through the front of the grate into the room; it likewise more completely consumes the coals.

A.D. 1873, February 18.—No. 594.

LEE, JOHN HODGSON, of the Naval and Military Club, Saint James', in the county of Middlesex, Lieutenant in Her Majesty's Royal Navy, on the retired list, and PRINGLE, CHARLES, of Ivy Lodge, Brixton Hill, in the county of Surrey, Captain in Her Majesty's Royal Navy.—“Preventing the destruction of boilers and engines by galvanic action.”

The introduction of zinc into boilers, engines, and such like when fitted with fittings containing copper, and thereby diverting the galvanic action.

A.D. 1873, February 18.—No. 595.

JACKSON, JOHN, of No. 17, Gracechurch Street, in the city of London, engineer.—“Improved apparatus or means for attaching discs to ropes, and for preventing the slipping of ropes in passing over or round drums.”

The chief object of this invention is to substitute wire rope for the chains now used in what are known as chain pumps, and the invention consists firstly of apparatus or means for attaching the lifting discs of the pump to the rope, and secondly of apparatus or means for preventing the rope slipping in passing over or round the drum at the top part of its travel; the first part of the invention also applies to securing discs to ropes for other purposes, and the second part to preventing the slipping of ropes in passing over or round drums employed for other purposes, such for example as those used in hauling.

A.D. 1873, February 18.—No. 596.

SAMBROOK, WILLIAM, of Liverpool, in the county of Lancaster.—“Improvements in heating the feed water of steam boilers, and in apparatus employed therefor.”

The features of novelty which constitute this invention consist in heating the feed water of steam boilers by the direct application of a steam jet, or jets, from the boiler to the feed. The steam may be introduced into a cylinder or chamber containing a rose or perforated pipe which discharges a spray or shower of water from the feed pump. This steam acts upon the spray or shower and heats it or increases its temperature, the water heated by the steam continuing its course to the boiler.

A.D. 1873, February 18.—No. 597.

SHAW, JOHN, of the Neptune Iron Works, Newcastle upon Tyne, engineer.—“Improvements in machinery and apparatus for punching and shearing.”

My invention consists in actuating the punch of a punching machine or the cutting tool of a shearing machine by means of steam or hydraulic power, the water under pressure from an accumulator or from the force pump, or the steam being admitted to a cylinder in which is a piston; the rod of this piston is connected to the centre joint of two or four links forming a toggle joint. One end of the toggle joint is connected to a fixed centre, and the other end to the punching or shearing instrument.

A.D. 1873, February 18.—No. 598.

ASTON, JAMES JONES, of 13, Pembroke Gardens, Kensington, in the county of Middlesex, and of the Middle Temple, barrister-at-law.—“Improvements in paddle propellers.”

Improved paddles made of metal, very very narrow, but deep, and without any rings at the outer edges and properly immersed, to propel vessels faster than now, and with very much less breadth of paddle boxes, and therefore more useful for the Channel passage, and other boats.

A.D. 1873, February 18.—No. 599.

SUTTON, CHARLES WILLIAM, of the firm of Sutton and Company, of Stowmarket, in the county of Suffolk.—“Improved combinations of ingredients for removing acidity from ales, beers, porters, wines, &c., and also to preserve them from acidity.”

This consists in the employment of hydrate of lime and chloride of sodium in combination, or hydrate of lime and chloride of ammonium in suitable quantities with distilled water for depriving ales, beers, wines, &c. of excess of acid and also for preserving them from acidity.

A.D. 1873, February 18.—No. 600.

PAIN, JAMES, of Walworth, in the county of Surrey, pyrotechnist.—“Improvements in rockets, lights, and projectiles for giving distress and other signals at sea or elsewhere.”

The first part of this invention has for its object improvements in rockets for giving positive signals from vessels in distress, the rockets being provided with self igniting appliances such as fulminates or percussive compounds, so that they can be fired from the deck of a ship or elsewhere without the application of a light as heretofore, and also ascending into the air without the encumbrance of a stick.

These improved signal rockets are charged with combustible and explosive materials, so that when at their highest altitude they show a number of red or other suitably colored lights and explode with a loud report so as to be heard at a considerable distance. The rockets are fired or discharged from a tube fixed in any convenient part of a ship or vessel. The person firing such rockets has simply to pull a lever handle which causes a needle or instrument to puncture the nose of the rocket in order to destroy a capsule containing fulminate or other explosive compound, by which the rocket is ignited.

Or each rocket may be furnished with a percussion cap tube or capsule, so as to be exploded by a hammer combined with the firing tube or otherwise as may be found most convenient.

Each rocket is provided with feathers or wings which serve to guide them in their flight, in place of employing sticks as heretofore for this purpose.

In like manner rockets or lights of various colors for signalling or other purposes may be provided with self igniting appliances and guiding feathers or wings as previously described in accordance with these improvements.

Stationary colored lights upon deck or elsewhere provided with self igniting appliances and fired as previously described may also be employed so as to show a long continued colored flame after the ascent of each rocket, clearly indicating a vessel in distress.

This invention also relates to the employment of maroons or similar projectiles which are fired from a mortar or tube placed on the deck of a vessel or elsewhere for the purpose of giving distress or other signals. For this purpose maroons or similar projectiles are constructed, so that they will explode when at a great altitude, and produce a brilliant red or other coloured flame together with a loud report so as to be seen and heard at a considerable distance.

A.D. 1873, February 18.—No. 601.

MARSHALL, JAMES, MARSHALL, HENRY DICKENSON, and MARSHALL, CHARLES, all of Gainsborough, in the county of Lincoln.—“Improvements in the straw shaking apparatus of thrashing machines.”

These improvements relate first to the introduction of a number of tips to shake the straw, and pass it along from the thrashing drum in lieu of the longitudinal boxes or other appliances now generally used for this purpose. These tips are lathed or otherwise covered with small spaces left between, and are suspended upon a bar with bearings at each end.

Motion is imparted to these tips by means of springs or other mechanical appliances connected with the

usual dressing shoes; one end of such springs or appliances being connected to the tips, and the opposite end to the dressing shoes, the reciprocating motion of the latter imparting an oscillating motion to the tips.

Boards are placed edgeway between the tips in order to prevent the straw from falling between them.

A.D. 1873, February 18.—No. 602.

JENSEN, PETER, of 89, Chancery Lane, in the county of Middlesex, engineer and patent agent.—(*A communication from Julius Erichsen, of Copenhagen, in the Kingdom of Denmark.*)—"Improvements in and connected with coke ovens, and in the utilization of heat resulting therefrom."

Gas retorts heated by waste heat of coke ovens, and crude lighting gas from the retorts mixed with waste heat from the coke ovens utilized for heating, evaporating, and boiling purposes.

A.D. 1873, February 18.—No. 603.

MINSHALL, WILLIAM, of Stockport in the county of Chester, and DUNKERLEY, BENJAMIN, of the same place.—"Improvements in apparatus for felting hat bodies or other felted fabrics."

This invention relates to portable and stationary milling stocks or bumpers, in which hammers or felting blocks move to and fro in a radial direction in a trough or chest, the hammers being raised by tappets, and afterwards falling by gravity against the fabric to be felted, or the hammers are worked by cranks.

At present in this description of machine not more than two hammers are used, and for an increased product the trough is enlarged in its depth and length, but not transversely, but the trough so enlarged has a prejudicial effect on the shape of the felted fabric.

Instead of using only two hammers, and enlarging the trough in depth and length, three, four, or more hammers are used, and the trough widened or enlarged transversely, so that by using any desired number of hammers and keeping the trough at its best form in depth and length, felted fabrics can not only be kept at their proper shapes but obtain a greatly increased amount of product with the least expenditure of power and labour, the hammers working at their greatest speeds, and the tappet wheels and working parts being of their smallest diameters and weights.

A.D. 1873, February 18.—No. 604.

TURNER, GEORGE, of Horton, near Bradford, in the county of York, spinner and manufacturer, and BALDWIN, JOHN CLAYTON, of Horton, aforesaid, overlooker.—"Improvements in machinery for preparing, combing, and finishing wool and other fibres."

This invention relates to the fluted rollers employed on the various machines employed in preparing, combing, and finishing wool and other fibres, and over or between which rollers, belts or aprons of leather are passed, the said rollers being driven by the flutes or grooves thereon, and in consequence the pressure and wearing effect on the belts is very great.

Rollers for these purposes, according to this our invention, may be constructed with the grooves of less depth than heretofore, and gear wheels are applied on the spindles of the rollers, whereby we prevent slipping, and decrease the pressure required for driving the bands.

A.D. 1873, February 18.—No. 605.

ROLIN, ERNEST, of the firm Eugène Rolin et Ce., of Braine le Comte, (Belgique).—"An improved weighing machine."

The improvements described in this Specification are effected by making the arms of the various levers square or at right angles with each other. By placing the mechanism outside of the platform or table. By making the box or case of cast iron, serving at the same time as a seating or bed plate for the mechanism, and by an improved mode of blocking or wedging the weigh beam when not in use for weighing, and allowing the table to rest immovably on supports arranged for the purpose.

A.D. 1873, February 18.—No. 606.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from Robert W. Gardner, of Quincy, in the county of Quincy and state of Illinois, United States of America.*)—"Improvements in steam governors."

The first part of this invention relates to governors in which the valve is opened by a weighted lever and closed by the governor balls, and consists of a fulcrum for the lever arranged to let it fall and close the valve

on its working seat when the belt breaks or runs off, the said fulcrum being held in the working position by devices controlled by the strain of the belt and released or tripped by the cessation of the strain.

The second part of the invention is applicable to different governors, and consists of a valve seat of hardened steel or other durable metal secured in the casting of the valve chamber in a novel manner; also a facing of the valve with the same and a mode of applying it.

The third part of the invention consists of a hollow clamping or fastening stem for securing the valve seat arranged to receive a guide stem for the lower end of the valve.

A.D. 1873, February 18.—No. 607.

NOBLE, GEORGE, of Thurlby House, Woodford Bridge, in the county of Essex, gentleman.—“An improved method of treating fibrous materials for the manufacture of pulp for paper.”

This invention consists in steeping or soaking the fibrous materials, including plants in the ripe or unripe state, in a solution of warm water and caustic soda, in proportions varying according to the nature of the materials to be treated, and then boiling them with the addition of the necessary quantity of water.

A.D. 1873, February 18.—No. 608.

NEWTON, ALFRED VINCENT, of the Office for Patents, 66, Chancery Lane, in the county of Middlesex, mechanical draughtsman.—(*A communication from Samuel Hogg Bingham, of Philadelphia, in the state of Pennsylvania, Edward Beattie Bingham, of Newark, in the state of New Jersey, George Washington Van Allen, of the city and state of New York, and William Nelson Stone, of Philadelphia aforesaid, all in the United States of America.*)—“Improvements in printing presses.”

The object of this invention is to so construct a printing press that the exactly opposite sides of a sheet, or the outer sides of two sheets, can be printed simultaneously, or a sheet printed on opposite sides at intervals; and the invention principally consists in the connection with each other of two printing cylinders placed parallel and close to each other, so that the paper to be printed will pass between them, both said cylinders being printing cylinders, and both also pressure cylinders, each one printing, and each one pressing.

A.D. 1873, February 18.—No. 609.

SMYTH, DAVID Mc CONNEL, of Orange, in the state of New Jersey, United States of America.—“Improvements in sewing machines.”

A cam revolved once during a given number of stitches brings into action the feeding motion that acts longitudinally as usual or locks the same out of action and simultaneously brings into action a lateral feeding motion acting either one way or the other, or allowing both to act simultaneously for diagonal or zig-zag stitching. By varying the cam a great variety of ornamental stitching can be produced adapted to shoes, gaiters. The device is an improvement upon Patent No. 3166 of 1871 and 1131 of 1872.

The improvement is adapted to wheel or reciprocating feeds in sewing machines.

A.D. 1873, February 18.—No. 610.

FORREST, HAMLET EDWIN, of Boston, of the state of Massachusetts, of the United States of America.—“Improvements in tools for finishing metallic axle blanks.”

This complete Specification describes my invention, the object of which is to furnish a more simple, perfect, and ready means of finishing metallic axle blanks than heretofore employed.

The formation of journals upon axle blanks by means of a lathe as heretofore carried on, by means of a narrow tool or series of tools, not only involved a high degree of skill and care but consumed a large amount of time, while at the same time only an approximation to a uniformity in size has been attained. My invention enables a mere novice in the art of reducing or “turning” metal to produce or “turn” any number of axles of one unvarying standard size, and with a saving of at least one hundred per cent. in time and labor, and my invention consists in a peculiar shaped tool or cutter to be fixed upon a carrier, that is mounted and slides upon the bed of a lathe. This cutter is formed with a compound longitudinal inclination, by which it is not only caused to cut with a drawing stroke but also to give the desired taper to the journal, and my invention further consists in a peculiar arrangement of two or more of such cutters, whereby a most perfect smoothness and finish are imparted to the journals.

A.D. 1873, February 18.—No. 611.

CLARK, EDWIN, of 5, Westminster Chambers, Victoria Street, civil engineer.—“Improvements in machinery for raising and lowering ships and vessels.”

This Complete Specification describes arrangements for raising and lowering ships and vessels from one level to another.

A.D. 1873, February 19.—No. 612.

MORGAN-BROWN, WILLIAM, of the firm of Brandon and Morgan-Brown, engineers and patent agents, of 38, Southampton Buildings, London, and 13, Rue Gaillon, Paris.—(*A communication from Samuel Thomas Thomas, of Gilford, Belknap county, New Hampshire, United States of America*).—“Improvements in looms for weaving.”

This invention relates to details of construction of fancy looms, and particularly to the class termed “open-shed” looms, in which part only of the warp yarns are moved after each pick to form the shed.

In combination with vertical jacks to operate the elevator and depressor bars, gear-sectors are employed having teeth meshing into teeth on the jack-bars, the sectors have a cam-groove, into which extends a roll turning on a pin projecting from the harness lever, so that the sectors affect the rise and fall of the jack-bars.

Another portion relates to the arrangement of the starting and stopping mechanism of the loom by a friction-cone. Also to the drop-box mechanism, in which the boxes are drawn down positively instead of dropping by gravity, and in connection therewith a means of arresting their motion instantly by a set of levers in conjunction with the weft stop motion.

A.D. 1873, February 19.—No. 613.

WESTERN, CHARLES ROBERT, of the Victoria Works, Belvidere Road, Lambeth, in the county of Surrey.—“Improvements in band saws.”

This invention relates to a method of setting band saws so as to make an oblique cut, and to the construction of springs for band saws.

The saw is set for an oblique cut by moving one of the saw pullies laterally, so as to bring the line of the saw in a direction oblique to the table, which may also be made to cant into an inclined position in the usual way.

The spring employed is like a carriage spring, the ends of which bear on the block or framing which carries the upper saw pulley, while a tightening screw passes through the middle of the spring, and is provided with a hand wheel for adjusting the tension.

A.D. 1873, February 19.—No. 614.

CHANEL, CESAR, of No. 10, Rue de la Fidélité, Paris, in the Republic of France.—“An improved fuel.”

The invention consists in agglutinating or agglomerating begass (the ligneous residuum of sugar cane, after extraction of its juicy or saccharine principle) with resin, coal tar, or pitch, or any like agglutinating and combustible matter for the manufacture of fuel.

A.D. 1873, February 19.—No. 615.

ABNEY, WILLIAM DE WIVELESIE, of St. Margaret's Street, Rochester, in the county of Kent.—“Improvements in photo-mechanical printing, and in apparatus to be used in such printing.”

This invention consists in coating a flexible sheet of paper or linen with a solution of gelatine made sensitive to light with bi-chromate of potash, with or without the addition of chrome alum or other analogous substance.

The sheet so coated is dried and exposed to light under a photographic negative, and after having been washed is placed upon a flat support upon which it is pressed, and the picture upon its surface is inked with greasy ink by means of soft rollers and is then transferred to the surface of stone or zinc in the usual way, and pictures are obtained from it in a lithographic printing press. By this method the film is inked whilst still wet, and the photographic negative need not be reversed, nor is it necessary that it should be of great density in its opaque parts.

A.D. 1873, February 19.—No. 616.

RICKARD, SAMUEL, and FOSTER, ESAU, of Halifax, in the county of York.—“Improvements in “ domestic fire-places for radiating heat and economizing fuel.”

The improvements consist in the application to fire ranges or grates of a heat deflector or plate of metal, fire brick, or other suitable material. This plate is placed at an incline over the fire range or grate, resting at its bottom end on the back part thereof, inclining upwards towards the mantel, leaving a space betwixt for the passage of the smoke, being held in position by either a grate, or one or more props attached to the deflector.

A.D. 1873, February 19.—No. 617.

LIGHTOWLER, JONATHAN, draper, and BEST, JAMES ROBERT, contractor, both of Bradford, in the county of York.—“Improvements in kitchen cooking grates or ranges.”

I construct the fire place or grate open at the front as usual, and provide three passages or ways for the heated gases, these are each connected with the chimney; over the fire I place a hot plate, through which are three dampers in a vertical position, one being over the passage or way leading to the oven, another such damper being over the passage leading to the boiler, and a third such damper being over the passage leading to the chimney.

A.D. 1873, February 19.—No. 618.

WILDE, HENRY, of Manchester, in the county of Lancaster, engineer.—“Improvements in machinery and “ apparatus for producing, regulating, and directing electric light, part of which is applicable to other “ purposes.”

My invention consists, firstly, in improvements in the electro-magnetic induction machine, described in the Specification of Letters Patent granted to me on the 23rd day of March 1867, No. 842.

In the present improvement the helices in which the currents are induced, instead of being coiled round the armatures are coiled round the extremities of the iron cores of the electro-magnets, which are prolonged for that purpose, or have iron cores fixed thereto, and an iron wheel or disc, the periphery of which is divided into as many segments as there are electro-magnets in each circle, is made to revolve between the circles of stationary electro-magnets and coils for the purpose of generating electric currents.

My invention consists, secondly, in improvements in the apparatus for regulating the approach of the carbons used for producing the electric light as they are consumed by the current. In this improvement the carbons are made to approach and to separate from each other by means of a right and left handed screw, connected with the carbon holders. Each of the screws, with its carbon holder, can be actuated independently of the other.

My invention consists, thirdly, in apparatus for directing and projecting the electric light upon distant objects. In this improvement the light is condensed into a single beam by means of a holophote, or a parabolic reflector mounted on a platform, on which is also placed the regulator above described. The whole apparatus retains whatever position is given to it both horizontally and vertically without the use of any locking movement.

A.D. 1873, February 19.—No. 619.

FINDLAY, DAVID BUCHAN, of Liverpool, in the county of Lancaster.—“Improvements in apparatus for “ raising sunken ships and other submerged bodies.”

The features of novelty which constitute this invention consist in a novel method of raising submerged bodies. In carrying the invention into practice, a suitable lighter or floating medium is placed over the submerged body to be lifted. Across the lighter are placed balks of timber projecting over the lighter at each side. Upon the balks and outside the lighter are placed blocks or crossheads, and between these blocks or crossheads and the balks are placed hydraulic rams or jack screws. The lifting chains being attached to the submerged body, the ends are passed up through the balks and blocks through an opening provided for that purpose. The chains are then stoppered by a toggel on the top of the block or crosshead, and the rams or lifting power put into operation. When the blocks are lifted, a toggel is placed through the link of the chain, just over the balk. The blocks are then lowered, a toggel again inserted through the chain above the block, and the process of lifting repeated. By this method raising chains can be floated link by link, or as required.

A.D. 1873, February 19.—No. 620.

SHEARMAN, HENRY FRANKLIN, of Martin county, Minnesota, United States of America, but at present of 15, Water Street, Liverpool, in the county of Lancaster.—(*A communication from John Alexander Montgomery, of Millburn, New Jersey, United States of America.*)—"Improvements in journal boxes."

The features of novelty which constitute this invention consist in forming a journal box or brass in the shape of a sphere or segment of a sphere, the shaft passing through its centre. This sphere or segment of a sphere fits into a cup, cups, or concaves formed in the block or bearing and cover carrying the journal box. The sphere, or segment of a sphere, forming the journal box or "brass" is prevented from revolving with the shaft or journal by a pin and slot or their equivalent. This pin is fitted on the underside of the sphere and takes into a slot in the block or bearing; this pin and slot are arranged so as to give the journal box or "brass" sufficient universal play to allow for any inaccuracy or "wabbling" in the shaft carried or in the journal.

A.D. 1873, February 19.—No. 621.

PAYTON, WALTER, of No. 21, Great George Street, Westminster, in the county of Middlesex.—"Improvements in safety and relief valves."

This invention relates to the construction and working of safety and relief valves, so that only a small load is required to control the opening of a large valve, and that the apparatus is an accurate and sensitive measure of pressure.

The main valve is extended upwards so as to work like a plunger in the casing (which is closed at the top), and has through it a small passage by which the upper part of the casing is supplied with fluid, which presses the valve downwards while the fluid in the vessel acts on a smaller area to press it upwards.

At the side of the main valve is a small valve loaded with a weight or spring adjusted to the required pressure, and having a piston or plunger attached to its stem, or having its stem resting on a diaphragm. Under this small valve, but above its piston, plunger, or diaphragm, is a passage to the upper part of the main valve casing.

When the small valve is raised by the pressure acting on its piston, plunger, or diaphragm being in excess of its load, fluid escapes from the upper part of the main valve casing faster than it is supplied by the small passage through the valve. The main valve, being thus relieved of pressure, rises and allows fluid to escape by lateral openings in the casing.

A.D. 1873, February 19.—No. 622.

ELLINGTON, EDWARD BAYZAND, of the city of Chester, engineer.—"Improvements in hydraulic hoists."

This invention relates to an arrangement of hydraulic hoist in a simple and compact form, so as to work by single or double purchase as desired. Two hydraulic cylinders are placed side by side with a four way cock or slide, so that when the ram of the one is forced outwards by fluid pressure, the ram of the other is relieved of pressure. An endless chain is passed over pulleys on the ends of the rams and pulleys at the opposite ends of the cylinders and a pulley on a shaft, on which is fixed a larger pulley working the hauling rope or chain.

The endless chain can be secured by a stop pin inserted at the end of one of the rams, or at the end of one of the cylinders. In the former case the apparatus works at double purchase, the whole power of the outgoing ram being delivered to the hauling pulley. In the latter case the apparatus works at single purchase, the outgoing ram delivering half its pressure over double its stroke to the hauling pulley.

A.D. 1873, February 19.—No. 623.

CHAMBERLAIN, HUMPHREY, of Round Green, Barnsley, in the county of York, engineer.—"Improvements in the manufacture of mortar, beton, and concrete."

This invention consists essentially in the application and use to and in the manufacture of mortar, beton, and concrete of the waste lime from gas purifiers which has hitherto been treated as a comparatively useless refuse. I have found by experiment that "gas lime," by which name such before mentioned waste lime is known, produces an equally good or superior mortar to fresh lime. It is simply requisite to grind it up in the usual mortar mill, or to mix it as ordinary lime with sand, ashes, and such like materials. The said refuse lime is also suitable as a substitute for fresh lime in making concrete or "beton," which may or may

not, as required, be moulded into bricks or blocks in any well known manner, and in the event of a very hard substance being required, a portion of Portland cement may be used in combination with the said refuse lime.

A.D. 1873, February 19.—No. 624.

FOWKE, CHARLES, of Birmingham, in the county of Warwick, manufacturer.—“Improvements in sewing machines.”

This invention consists in applying to sewing machines two shuttle reel winders instead of one as in ordinary use, and the improvements are intended more especially for hand machines having a driving wheel capable of being loosened at will.

A.D. 1873, February 19.—No. 625.

SANDERS, FRANCIS, of Birmingham, in the county of Warwick, attorney and solicitor.—(*A communication from Richard David Sanders, of Bombay, in the Empire of British India, engineer.*)—“Improvements in communicating or signalling on railway trains, and in warming railway carriages.”

According to this invention for the purpose of communicating or signalling on railway trains, a receiver containing condensed air is fixed under the tender of the engine, the condensing air pump of which is worked by the engine or by hand. In communication with this receiver is a hollow cylinder, having within it a disc or piston smaller than the cylinder. A rod from the disc passes through the cylinder, and is connected to the lever of a steam whistle or other alarm. The top of the hollow cylinder is in communication with a pipe running under the carriages, branch pipes therefrom passing to the compartments of the carriages, and being furnished with stopcocks. When the apparatus is in its normal condition the disc or piston in the cylinder is balanced; but if by accident the train is divided and the pipe under the carriages is ruptured, there is a free passage of the condensed air from the ruptured pipe. The pressure of the air in the receiver being no longer counterbalanced, the said air rushes through the cylinder and raises the disc therein, which opens the stopcock of the steam whistle or alarm, and the said whistle or alarm is brought into action. The same operation takes place when a passenger opens one of the stopcocks in the carriages. In the latter case the compartment from which the signal is made is indicated by a flag, which is blown by the escaping air from a tube passing out laterally from the carriage.

To adapt this invention to the warming of railway carriages, the condensed air is passed through a coil of pipes in the smoke box of the engine, and the pipe under the carriages is connected with shallow boxes which form a portion of the floor of the carriages and act as foot warmers, the heat arising from them also warming the carriages.

A.D. 1873, February 19.—No. 626.

KÖRTING, ERNST, of Hanover, in the German Empire, engineer.—“Improvements in steam jet apparatus, and in air condensers.”

Two or more mixing nozzles of increasing sectional area are placed one behind the other, the front opening of each communicating with the fluid to be moved. The steam mixes with fluid, and blowing from each mixing nozzle serves as a driving jet to a new body of fluid in the next mixing nozzle, thus gradually reducing the velocity of the steam jet, and accelerating that of the fluid.

Valves, cocks, or slides control the communication between the nozzles and the fluid. Each mixing nozzle has a separate connection with the steam. Valves, or the like, are used for preventing the blow back, and for other purposes. For furnaces, &c., a chamber combined with the blower contains drying material, through which the air passes, the escape water being used as feed water. The apparatus may be fitted to the exhaust pipe of non-condensing engines for condensing exhaust steam. The hot air from the drying chamber may be led back into the furnace.

A.D. 1873, February 19.—No. 627.

SMITH, THOMAS JAMES, of the firm of Robertson, Brooman, and Company, of 166, Fleet Street, in the city of London, patent agents.—(*A communication from Paul Giffard, Alexandre Sublet, and Jules Armengaud Jeune, all of 23, Boulevard de Strasbourg, Paris, France.*)—“Improvements in the means and apparatus for producing ice and cold for refrigerating purposes.”

This relates to means and apparatus for cooling air by means of its expansion after having been closely compressed. The chief novelties consist in the use of a third cylinder called the “compensator,” in addition

to the compression and expansion cylinders, which have already been used for the purpose, in bringing the air during its compression into intimate contact with water, and in so arranging the apparatus as to make it work with very little friction.

A.D. 1873, February 19.—No. 628.

STANLEY, JOHN MARTIN, of Sheffield, in the county of York, engineer.—“Improvements in the arrangements for generating and applying heat in rotary and cylindrical puddling, and other furnaces.”

The novelty in this case consists in the method of generating and forcing heat through the same end or neck of the vessel or cylinder, through which the waste gases are returned.

A.D. 1873, February 20.—No. 629.

MICHAUD, PIERRE FRANÇOIS, builder, of No. 35, Rue des Martyrs, Paris, France, at present of Lyons.—“Improvements in axletree boxes and muffles for carriages and other vehicles for transmitting shafts and all parts of machinery having a rotary motion, and in the mode of construction thereof.”

The features of novelty in this invention consist, 1st, in the construction of axle boxes or muffles of organs having a rotary motion, by means of sheets of metal rolled and welded in a mold ad hoc, by means of a mandrel or punch of suitable form and dimensions.

2d, in the improvements introduced in the manufacture of the boxes and muffles in making them in two parts, boxing one within the other, and connecting them together by screwing, welding, tenons, or a bayonet method of fixing, and making one or more cavities acting as reservoirs for oil, grease, or other lubricant, to allow of its spreading itself uniformly on the revolving organ through orifices made in the inner piece. These two special features of the invention may be employed conjointly or independently.

The two edges of the sheets of metal are hammered thin for welding, and the plate is rolled by means of a flattening mill or other process. To this rolled plate two ears or ribs are welded, the box is then heated to white welding heat, and borne in the mold of desired form, the punch is then inserted and gradually beaten in by a vertical steam hammer or flattening hammer until it is considered the welding is perfectly effected by the lateral pressure.

The removal of the punch is effected by a lever traversing the body of the mold, which latter may be of a single piece or in several pieces.

When the plate is rolled many times round, the whole is welded together and forms a solid box.

A.D. 1873, February 20.—No. 630.

GOODWIN, WILLIAM, of Buxton, in the county of Derby, coach builder.—“Improvements in two-wheeled carriages.”

“Hansom cabs” and similar vehicles are constructed with a portable driver’s seat, and so as to admit of the vehicle being readily balanced with the driver’s seat either fixed or removed. The front end of each side spring is connected to a slide, and the hind stay where it is connected at each side of the body is rendered capable of moving horizontally so as to balance the vehicle.

Secondly. The front ends of the shafts can be raised or lowered for different sized horses by jointing the stay to which the hinder ends of the shafts are fixed and lengthening or shortening the stays for supporting the shafts by means of a regulating nut.

Thirdly. “Hansom cabs” with a leather head to turn down can be formed into open vehicles by making the side windows to slide into the body of the front windows to fold and turn down into receptacles in each side of the same.

A.D. 1873, February 20.—No. 631.

SPENCER, JAMES, and CONSTERDINE, JAMES, both of Hollinwood, in the county of Lancaster.—“Improvements in the construction of weighing machines.”

Our improvements are more particularly designed for what are called “pit bank” weighing machines, which are employed at collieries to weigh the corves or tubs of coal as they are brought to the surface, but they are equally applicable to other machines, such as are used for weighing carts, lorries, and railway wagons.

The improvements relate, firstly, to the construction of the stool which supports the weighing platform, and secondly to the construction and arrangement of the steelyards for indicating the weight.

As regards the construction of the stool we make the stool centres on the cup and point principle, whereby we dispense with all check links.

As regards the steelyard or indicator we form a compound steelyard made of two bars connected rigidly together and all actuated from the same centres. That is to say we have an upper and an under steelyard connected together by a bar at each end. The lower steelyard is marked with hundredweights or tons as may be required. The upper steelyard is divided into two parts by a fixed stop or collar; one part being for the purpose of "tareing" or weighing the tub or corve and marked accordingly, and the other part being marked with the smallest fractional parts that may be required for the class of goods which the machine has to weigh.

A.D. 1873, February 20.—No. 632.

WYATT, WILLIAM, of Ellesmere, in the county of Salop, engineer and surveyor.—"An improved corn meter for measuring and registering the supply of corn or grain."

The improved meter consists of an iron or metal drum made partly to revolve inside a cylinder. The cylinder has an opening at the top for admitting the corn or grain, and one at the bottom for letting it run out; and the drum which is made of the size necessary to contain the measure has an opening in its side which allows the corn or grain to run in when turned upwards, and to run out when turned downwards by means of a handle or other similar contrivance.

The drum is connected by means of a loose catch working on a stud with a register or series of dials similar to the dials of a gas meter, which will indicate or register the quantity or amount of corn or grain measured.

A.D. 1873, February 20.—No. 633.

GARDNER, DANIEL, of the firm of A. Gardner and Sons, of Glasgow, in the county of Lanark, North Britain, house & ship furnishers.—"Improvements in the construction of inlaid flooring which may also be adapted for ornamenting surfaces other than floors."

The features of novelty which constitute this invention are, the fixing the inlaid work upon a backing of wood, iron, steel, or other substance, which again is fixed on a backing of flexible material. And the production of coloured portions by inlaying coloured cements or their equivalents.

A.D. 1873, February 20.—No. 634.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Frederick Proudfoot, of Toronto, Canada, gentleman.*)—"Improvements in apparatus to be applied to steam-boilers for burning liquid fuel."

According to this invention liquid fuel is burned under a pressure of air from one pipe that supplies the supporter of combustion, and from another pipe upon the combustible material. The air and the oil being forced together from different directions are thus brought into contact and closely intermingled, and the combustion is made complete, uniform, and perfect.

A.D. 1873, February 20.—No. 635.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Frederick Proudfoot, of Toronto, Canada, gentleman.*)—"Improvements in steam boilers and their furnaces, and in apparatus connected therewith."

According to this invention I provide a steam boiler with a vertical air tight cylinder containing the fuel. A continuous combustion of fuel is produced by currents of air. The heat and products of combustion after they have passed through a horizontal flame chamber are conveyed to the water in the boiler, and return through the boiler, discharging into the water through a pipe having perforations. The boiler is provided with concave projections running through its length, so that the ebullitions of water are thrown back into the middle of the boiler. The dome of the boiler is provided with concave pieces to act as additional deflectors. Air tight doors are arranged to open inwards for producing a natural draught.

A.D. 1873, February 20.—No. 636.

BROWNE, JOHN COLLIS, of the Cedars, Hampton Wick, in the county of Middlesex, physician.—"Improvements in apparatus for lowering and disengaging boats from ships and vessels, also for hoisting boats."

This relates to the employment of scissor shaped holders with prongs for engaging the rings of the boat slings, also to special means of roving the tackle to prevent kinks occurring.

A.D. 1873, February 20.—No. 637.

PILON, CHARLES COULTAS, of No. 162 Camden Street, Camden Town, in the county of Middlesex, and of No. 14, Basinghall Street, in the city of London, commercial traveller.—“Improvements in the manufacture of pouches, cases, purses, and boxes, for holding tobacco, fusee, or other lights, cards, bills, and documents generally, also money, or other articles and things.”

This relates to cases with both ends open, each end being fitted with flaps to be drawn over to form bottoms; either flap can be moved to get at the contents.

A.D. 1873, February 20.—No. 638.

GABRIEL, JOSEPH SUTCLIFFE, of Grelliers Wharf, Belvedere Road, in the county of Surrey.—“Improvements in machinery for sawing stone.”

This invention has for its object improvements in machinery for sawing stone.

In order to drive the saw frame a pendulous beam is employed suspended by its upper end. To give motion to this beam a crank is formed upon the engine shaft, and by two connecting rods this crank is coupled with slides working in guides. From the slides a return connecting rod passes to the pendulous beam.

A.D. 1873, February 20.—No. 639.

LANCASTER, GEORGE, and DE LA RUE, WARREN WILLIAM, both of Bunhill Row, in the city of London.—“An improved apparatus or marking board to be used in scoring games.”

This Provisional Specification describes making a marking board of several plates of cardboard rivetted together.

All the plates except the lower one have two parallel slots punched in them, so that the board when put together has two parallel guide grooves in it in which run slides carrying pointers.

A.D. 1873, February 20.—No. 640.

TREMLIN, RALPH JAMES, of Maidstone, in the county of Kent, brewer.—“Improvements in purifying fusty and otherwise impure casks, and in seasoning new casks and timber to be made into casks.”

This Provisional Specification describes employing bisulphite of lime mixed with water, heated by steam or it might be hot air being blown into or through it, or being otherwise heated.

A.D. 1873, February 20.—No. 641.

BELL, THOMAS, of Newcastle upon Tyne, ironmaster, and GOODMAN, ALFRED, of the same place, engineer and iron founder.—“Improvements in foundry or cupola furnaces.”

This Provisional Specification describes utilising the gases from one cupola by burning them in a second.

A.D. 1873, February 20.—No. 642.

MARTIN, WILLIAM GEORGE, Major, R.Ay., and MARTIN, RICHARD EDWARD ROWLEY, Lieutenant, 77th Regiment, both of Hemingstone Hall, in the county of Suffolk.—“Improvements in the manufacture of artificial fuel.”

This Provisional Specification recommends the following proportions, but they may be varied:—

Small coal	-	-	-	-	-	-	-	30 parts.
Kimmeridge coal or clay	-	-	-	-	-	-	-	5 parts.
Lime	-	-	-	-	-	-	-	5 parts.

A.D. 1873, February 20.—No. 643.

TOPHAM, CHARLES, of Coleman Street, Bunhill Row, St. Luke's, in the county of Middlesex, engineer.—“Improvements in stoves and fire places and in chimneys and flues.”

The chief feature of novelty in this invention is the construction of stoves, fire places, flues, and chimneys with an additional or outer casing, leaving between it and the inner casing spaces or passages, having inlets and outlets, so as to admit air into these spaces, heat it in its passage through them, and supply the heated air thus obtained to increase the heat of chambers, apartments, public buildings, conservatories, warehouses, factories, and other edifices or places requiring to be heated.

A.D. 1873, February 20.—No. 644.

FAREY, BARNARD WILLIAM, of the firm of Bryan Donkin, and Company, of Bermondsey, in the county of Surrey.—“Improvements in the valve gear of steam and other motive power engines.”

In compound engines in which the steam or elastic fluid working the engine passes in succession into two or more cylinders, I couple the slide valve of the first or high pressure cylinder with the slide valve of the second or low pressure cylinder by means of a rod which passes from one valve to the other within the passage which conveys the steam (or fluid) from one cylinder to the other. The rod catches hold of the high pressure cylinder slide valve on the exhaust or under side, and on the low pressure cylinder slide valve on the top. The arrangement is similar where more than two cylinders are employed.

A.D. 1873, February 20.—No. 645.

WEBSTER, JAMES, of Birmingham, in the county of Warwick, engineer.—“Improvements in applying “gases or vapour to the refining and purifying of metals, and in apparatus to be employed for that “purpose.”

The gas or vapour used consists of an admixture of vegetable carbon and hydrochloric or nitrous or nitric acid, but by preference wood naptha and hydrochloric acid, mixed in suitable parts, combined with atmospheric air, and in some cases coal gas, the whole being driven in the form of a vaporous gas through an outlet pipe of the apparatus into the furnace; the apparatus consists of an iron tank enclosing an earthenware receiver partly filled with coke, and on the top of the receiver is a glass globe containing the mixed fluid which is drawn off in suitable quantities onto the cokes, the air and gas coming up through the cokes and combining with the mixed fluid.

A.D. 1873, February 20.—No. 646.

CATON, JOHN, of Blackburn, in the county of Lancaster, builder.—“Improvements in the construction “and arrangement of domestic and other fire places, whereby the fuel used in the said fireplaces, and the “heat obtained therefrom, are greatly economized.”

I construct the grate with a false bottom by preference of a fire clay perforated slab, having a plate of iron or fire-clay placed vertically in a groove on the perforated slab, and leaving a space or chamber between this plate and the ordinary fire back, in which air is heated and directed by the ends of the said plate to the front of the fire bars, between which it escapes to the room.

Beneath and slightly projecting beyond the bottom grate is an inclined grating or screen on which the ashes or refuse falling from the fire falls.

A.D. 1873, February 20.—No. 647.

MERCER, JOHN, of Blackburn, in the county of Lancaster, overlooker, and WORTHINGTON, SAMUEL KENWORTHY, of Blackburn aforesaid, innkeeper.—“Improvements in looms for weaving.”

For operating the “lagged rollers” employed on looms we mount on the end of each lag roller a catch or star wheel, underneath and bearing against which is a curved spring or “hammer head” supported in position by means of a spring. Attached to the “knives” are fingers or catches, which as the knives descend engage with a tooth or catch of the catch or star wheels thereby moving the same the distance between tooth and tooth, and so imparting the desired intermittent rotary motion to the lagged rollers and lags.

A.D. 1873, February 20.—No. 648.

SMITH, WILLIAM WASTENEYS, of Newcastle-on-Tyne, in the county of same town, civil and consulting engineer.—“An improved method of and apparatus for working and stowing anchors.”

This invention consists principally of a table or framework on which the anchor lays when not in use, but when required to be “let go” this table can be tilted or inclined by a lever until the anchor slides overboard—a derrick fixed to same axis lays flat on deck when not in use, but can be projected over the ship’s side when required to lift the anchor from the hawse to the table.

A.D. 1873, February 20.—No. 649.

BROUGHTON, FREDERICK, of 3, Hanover Cottages, Regent’s Park, in the county of Middlesex, and STEPHENS, ROBERT, and BRADLEY, GUSS ALFRED, both of No. 18, Green Street, Paddington, in the said county of Middlesex.—“An improved mode of locking railway signals and points.”

Fixing the various shunting points of side and cross rails by means of a series of rods and cranks connected and controlled by levers in the signal box. Also acting in conjunction with and securing the signals and semaphore to prevent accidents on railways.

A.D. 1873, February 20.—No. 650.

HENRY, MICHAEL, of Fleet Chambers, 68, Fleet Street, in the city of London, patent agent.—(*A communication from the Société Collet et de Lavillasse, of Landernau, and 17, Boulevard Saint Martin, Paris, France.*)—"Improvements in the mode of and apparatus for treating marine plants called sea weed, sea wrack, and algae, in order to obtain useful products therefrom for industrial and other purposes."

Sea weed, wrack, algae, or marine plants are treated preferably when fresh from the water before drying. They are incinerated in a close furnace into which air is blown or forced. The gases or vapours with the matters held in suspension are condensed in damp condition. The utilizable products that escape from the main combustion may be brought back to the furnace. A furnace is described in which hollow fire bars (wherein air or water circulates) are used, and the materials fall on to a plate under which may be a second grate, and thence they are raked into moulds. The gases and vapours with the matters which they hold in suspension pass into a chamber in which there is an air or water circulation. Cold water may be showered in. The products are collected in channels leading to a receiver. A fan or blower extracts the air from the chamber and passes it into the furnace.

A.D. 1873, February 20.—No. 651.

HENRY, MICHAEL, of Fleet Chambers, 68, Fleet Street, in the city of London, patent agent.—(*A communication from Marie Philippe Auguste Pinel and Edouard Jules Joseph Lecœur, both of 17, Boulevard Saint Martin, Paris, France.*)—"Improvements in the mode of and machinery or apparatus for preparing fibrous materials for being spun."

Air, gas, or aeriform fluid, is used to guide and move fibrous materials to parts of combing, carding, teasing, or preparing machines.

In the apparatus described, sets of bars forming jaws turn in guide ways in a frame with air passages. Each jaw with the next forms a pair of nippers opened and closed by toothed cams. Rollers feed the fleece to the jaws, between which it is blown by a fan or blower. When the jaws close the fleece is cut. The jaws present the fibres to a carder or combing roller or appliance cleared by a revolving brush. The impurities are blown away. Rollers guide the fibres. They fall in layers on an incline, and are pressed and condensed again into a fleece. The material thence passes into a turning can or coiler. A machine with special arrangements of gearing is described.

A.D. 1873, February 20.—No. 652.

SIMMONS, GEORGE ALEXANDER, of Great Saffron Hill, in the county of Middlesex, manufacturer of barometers and other scientific instruments.—"Improvements in barometers."

This invention relates to barometers with bent tubes, the shorter limb being stopped by a stopper or plug, which is opened and closed (raised and lowered) by rack and pinion, or other mechanical contrivance actuated from outside the case or frame of the barometer without necessitating the opening of the frame or case and the disturbance of the parts by hand.

A.D. 1873, February 21.—No. 653.

COOPER, THOMAS POOLLY, of No. 3, Frideswide Place, Kentish Town, in the county of Middlesex, gentleman.—"An improved mode and means for closing and fastening railway carriage doors."

This invention has for its object the closing simultaneously and fastening of the whole of the doors of a railway passenger train before its departure from any station or depôt—and on arrival at any station or depôt the unfastening of every door, but without opening.

A.D. 1873, February 21.—No. 654.

STANLEY, JOHN MARTIN, of Sheffield, in the county of York, engineer.—"Improvements in the arrangements for utilizing the waste heat in the flues of boiler and other furnaces."

The novelty in this case consists in circulating steam through a tier or coil of pipes or tubes heated by the waste or escaping heat generated in boiler or other furnaces.

A.D. 1873, February 21.—No. 655.

SHAKESPEAR, JOHN DAVENPORT, of Augusta Road, Ramsgate, in the county of Kent, gentleman.—“Improvements applicable to harmoniums, American organs, and similar musical instruments.”

The object of the invention is to provide a means of working the bellows or the exhaust in such a manner as to relieve the player from the labour when required.

The ordinary treadles or the rods communicating with the bellows or the exhaust are acted upon as required by means of lines passing over guide pulleys, such lines being worked by a crank or cranks on a shaft (with or without a fly wheel on it) turned by an attendant. But the apparatus may also be worked by the player.

A.D. 1873, February 21.—No. 656.

CAMPBELL, MURDOCH, of Clonreher Castle, Maryborough, Queen's County, Ireland.—“Improvements in arrangements and apparatus for preparing peat, small coals, coal tar, petroleum, or other similar substances for fuel.”

Improvements consist in macerating the peat into pulp by means of suitable mills, without water, or with water, petroleum or coal tar added thereto; afterwards it is moulded into solid, hollow, or perforated blocks or bricks by passing it through the dies of brick making machinery. Small coals and coal tar are also mixed together and moulded into blocks or bricks in like manner.

The drying shed is heated artificially and ventilated by a self acting screw cowl fitted on top of shed.

A.D. 1873, February 21.—No. 657.

DEAN, WILLIAM, gas engineer, and KEIGHLEY, JOHN, plumber, both of Bradford, in the county of York.—“Improvements in apparatus for raising beer or other liquids.”

This invention relates to employing bellows, which are fixed underneath the counter or in the cellar, and are set in motion by the weight of the person drawing off the beer or other liquids; air is forced by means of the bellows at the top of a cask or barrel displacing the liquid contained therein and forcing it to rise in the pipe connected with the drawing off tap. The bellows are worked by a ratchet fixed to a loose board fitted to the floor, which being pressed in causes the ratchet to lower, giving motion to a small pinion, which revolving works another pinion of larger diameter working in a ratchet attached to the bellows, pressing the bellows in and causing a current of air to pass into the cask or barrel. Levers can be used instead of the ratchets and pinions; these levers are fixed to the loose boards by pins and cross each other, having a centre stud near the top, on which the levers work; the bottom parts of the levers are longer than the tops, and are also fixed to the bottom of the bellows by pins; a check valve is fitted on the air pipe to prevent the return of the air or liquid.

A.D. 1873, February 21.—No. 658.

STEVENS, JAMES JOHN FREDERICK, of Darlington Works, Southwark, in the county of Surrey, railway signal manufacturer.—“Improved means or apparatus for compensating for expansion and contraction in rods, particularly applicable to railway point rods.”

The point rod is divided at about its centre as usual, and the ends of the two portions are connected to the arms of a pair of toothed segments, which gear together. Any alteration in the length of the rod, owing to variation of temperature, is compensated for by a slight movement of the toothed segments and their arms.

A.D. 1873, February 21.—No. 659.

HOUGH, EDWARD JORDAN, of No. 15, Tower Hill, in the city of London.—“Improvements in ships' life boats.”

This Provisional Specification describes constructing a life boat with two conical closed air chambers, one at each end. These air chambers are mounted on a longitudinal axle and serve as wheels or rollers.

A.D. 1873, February 21.—No. 660.

STEER, ABRAHAM, of South Norwood Park, in the county of Surrey.—“Improvements in stoves or fire-places.”

For this purpose the stove is caused to project a short distance into the room, the smoke and products of combustion being first caused to pass upwards to the top of the stove, and then over divisions

into chambers at each side thereof. The smoke and products of combustion then pass downwards to the bottom of such side chambers, whence they pass by a passage or passages into the flue. Suitable dampers may be employed to regulate the draught as may be required.

A.D. 1873, February 21.—No. 661.

VAUGHAN, EDWARD PRIMEROSE HOWARD, F.C.S., of 54, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from Charles Scheidecker, residing at Paris, in the Republic of France.*)—"An improved apparatus for shearing or clipping sheep, horses, and other animals."

This invention relates to improved shearing or clipping apparatus, in which the pressure of the moveable cutting blade on the stationary toothed plate is maintained by the pitch of the spring forming the shear handle.

A.D. 1873, February 21.—No. 662.

HUMBER, JOHN, of Preston, in the county of Lancaster, cotton spinner, and HAWORTH, GEORGE, of the same place, manager.—"A new or improved aqueous apparatus for producing vapour to promote the health of the workers and to soften the yarn in any process from the raw material to the finished cloth."

The want of some kind of apparatus to distribute humidity in rooms where the several processes are carried on for or in preparing material for roving, spinning, and weaving (*and especially in weaving*), has long been felt. The novelty of this simple apparatus consists in applying in summer cold water or other equivalent, under pressure, through fine perforated or sponge mouthpiece or its equivalent into the rooms, which can be regulated to any degree of temperature at will.

A.D. 1873, February 21.—No. 663.

COLLIER, ELLIS, of Rochdale, in the county of Lancaster.—"Improved apparatus to be applied to domestic fire places for economizing fuel."

This invention is applicable to kitchen ranges and other domestic fire places and consists principally of a false back, either perforated or otherwise, which is so arranged that it can be either drawn forward bodily in a vertical or nearly vertical position, or it can be drawn forward only at the bottom into an inclined position so as to fill up a greater part of the bottom of the grate and leave the whole top its usual width if required for boiling, or if the top of the fire be not required, it may be drawn forward at the top, only so as to reduce the top and leave the bottom part the usual depth.

A.D. 1873, February 21.—No. 664.

TERRY, CHARLES FREDERICK, of Sheffield, in the county of York, accountant, and COCKER, SAMUEL, of the same place, steel manufacturer.—"Improvements in apparatus for safely and expeditiously detaching ships boats, or any other suspended weights, from blocks, cranes, or similar appliances, being also applicable for detaching locomotive engines, railway or other carriages, or trucks."

This invention consists in jointing or hinging two pieces of iron or steel near their bottom ends, and the axis upon which the two work serving as the axis for a loop or link to which the boat or suspended weight is attached. The portion above the pin or axis upon which the two pieces are hinged we construct with an outward bend or curve, and inside this, projecting from one side to the other, is inserted a spring, which keeps the portion below the pin closed firm; through this spring, and secured in one side of the apparatus is a rod or bar, which, when the two sides are pressed together by hand or lever, passes through a slot or opening in the opposite side; and to prevent the sides being pressed together by any accidental pressure we adjust a plate over the hole where the bar passes through. It will be readily observed that on the portion above the pin or axis being pressed inward, the portion below will open and thereby release the weight which it was bearing. For the detaching of locomotives, carriages, or trucks, we hinge a lever to one of the sides with a friction pulley, this lever being so arranged that it may either extend over the tender or along the side, or be so that it passes into the guard's van, and on being pulled, the friction pulley will press on the bend or curve and open the portion which gripped the coupling link or bar, thereby releasing the engine or carriage.

A.D. 1873, February 21.—No. 665.

GOREHAM, WILLIAM, of Gally Hill, Swanscombe, in the county of Kent.—"Improvements in kilns and apparatus used in the manufacture of cement."

This Specification describes placing a series of cement kilns in a circle and arranging them so that the

gases from the top of one are led to the bottom of the next. Store chambers are formed around the inner and outer sides of the ring of kilns, and the roof of these store chambers forms a platform from which the kilns are supplied with material to be burnt. Grinding apparatus and engine for driving the same is placed in the centre of the circle of kilns, and apparatus is used to lift the burnt cement drawn from the kilns up to the grinding apparatus, and also to convey it away when ground to the store chambers, to be stored into casks or otherwise. Arrangements for drying the slip are also described.

A.D. 1873, February 21.—No. 666.

GREENWOOD, ARTHUR, of Leeds, in the county of York, engineer.—(*A communication from Alwyn Payne, of Bridgeport, Connecticut, United States of America.*)—"Improved apparatus for feeding machinery employed in the manufacture of percussion caps, cartridge cases, ferules, and other analogous articles."

The object of this invention is to facilitate the feeding of partly formed percussion caps, cartridge cases, ferules, and other analogous articles to the machines in which they will either be finished or prepared for finishing.

A.D. 1873, February 21.—No. 667.

HENRY, MICHAEL, of Fleet Chambers, 68, Fleet Street, in the city of London, patent agent.—(*A communication from Louis Aristide Auteuil de Savignon, of 17, Boulevard Saint Martin, Paris, France.*)—"Improvements in the manufacture of sugar."

The cane or other material is cut, broken, crushed, or otherwise reduced, dried, and treated with cold water, whereby a pure saccharine liquor is obtained ready for boiling or subsequent treatment. The skin may be first crushed. The cane may be cut into discs and crushed or not. Hot water when used promotes formation of glucose.

A.D. 1873, February 22.—No. 668.

DENSMORE, EMMETT, of Meadville, Pennsylvania, and FARNHAM, CHARLES HAIGHT, of Milton, New York, both in the United States of America, now of Fleet Street, in the city of London, merchants.—"An improved type-writing machine."

Our said invention relates to a machine in which the types are operated by finger keys and produce their impression upon the surface to be printed through carbonized paper or other similar material. The said machine has a stand, upon which is mounted a table; over this table is a horizontal movable frame, which supports a cylinder whereon is carried the paper which is to receive the impressions of the type. This frame and the cylinder and parts connected therewith form the "carriage." It is hinged at the rear of the table to a bar or rod, whereon it is capable of turning and sliding, and at the front of the table it is supported on wheels, which allow it to move freely over the table. The said cylinder forms the platen; for feeding or moving the platen we use a weight and cord or a spring. A rack or ratchet bar is hinged to the frame of the carriage. In combination with the said rack we arrange two pawls on a rocking shaft, which operate to impart an intermittent endwise motion to the carriage. For returning the carriage to its first position after the production of each line of writing, we employ a treadle, from which a cord is passed over a pulley and connected with the carriage. The type hammers are supported by a horizontal ring. Each of the said type hammers has a shaft or stem provided with trunnions, which are supported in bearings in the said ring. These hammers are so arranged that their ends, whereon the types are fixed, will all come to the same point, which is the centre of the aforesaid ring. An inking tape or ribbon is arranged to pass between the said ring and the cylinder. The finger keys have at their outer ends buttons or knobs, each of which bears a letter or character corresponding to that of the type to be actuated by the key. Between the button and the pivot each key is connected by a wire rod or other means to the corresponding type hammer at the end opposite to that carrying the type. In addition to the aforesaid finger key we use a spacing key.

A.D. 1873, February 22.—No. 669.

PILKINGTON, JOHN, of Manchester, in the county of Lancaster, baker.—"Improvements in fire-wagons employed in the heating of bakers' ovens."

The inventor forms the fire grate with sides projecting downwards and resting on the bottom of the wagon. The wagon top is formed in segments, with vertical sides, wider apart than the sides of the lower part of the wagon. Escape of air, arising from cracked or warped castings, is prevented.

A.D. 1873, February 22.—No. 670.

TONGUE, WILLIAM, of Kennington, in the county of Surrey, engineer.—“Improvements in machinery for combing fibrous materials.”

This invention relates to improvements upon machines for combing fibrous materials, for which Letters Patent were granted to William Tongue, dated the 27th August 1870, No. 2356, and the 15th April 1872, No. 1114, the improvements being applicable to other machines for combing fibrous materials.

The fringe of fibres is accumulated after it has been detached, and a greater bulk of fibres is thus presented to the drawing rollers. The fibres may be packed together laterally, or they may be superposed. The fringe of fibres is transferred to a holder moving more slowly than the nipper. The holder may be a comb ring or a nipper. A subsidiary traveling nipper is employed to aid in transferring the fringe to the accumulator. To accumulate the fibres by superposition, the fringe of fibres is delivered to an endless apron having a lateral oscillating movement. A roller is also employed to condense the fibrous material and ensure its entrance between the nipping surfaces. The stationary nippers are mounted upon ball joints. Two sheets of heckles are employed for combing the ends of the slivers, one of such sheets acts upon one side of the ends of the slivers, and the second heckle sheet or a card sheet acts afterwards upon the other side.

A.D. 1873, February 22.—No. 671.

BLUNDELL, THOMAS, BLUNDELL, GEORGE THOMAS, and BLUNDELL, JAMES WALTER, all of Limehouse, in the county of Middlesex, engineers and coppersmiths.—“Improvements in the arrangements and construction of lavatories.”

This invention consists of an arrangement by which the power developed by water running to waste from the hand basin of a lavatory, is used to raise a fresh supply of water from a reservoir altogether or partly below the said hand basin.

The waste water is received from the hand basin by an airtight vessel. The clean water reservoir is also an air tight vessel. There is an airpipe connecting the two vessels in such way that when the pressure of the column of water in the waste pipe of the hand basin compresses the air in the waste water receiver, the air in the clean water reservoir is compressed to a similar extent.

The pressure of the air compressed in the clean water reservoir forces some of the water from this reservoir into the hand basin, or into a measure placed in such position that the water will flow from the measure into the said basin.

Suitable openings are provided in the airtight vessels, by which the waste water can be removed from the one, and the other can be filled with clean water.

A.D. 1873, February 22.—No. 672.

DEAKIN, FRANCIS, of Willenhall, in the county of Stafford, iron master.—“Improvements in puddling furnaces used in the manufacture of iron and steel.”

This invention consists in supporting the iron plates forming the bed of the furnace upon troughs of iron open at top resting upon transverse bearers. These troughs are supplied with water by a perforated pipe, the water from which trickles to the troughs, the level of the water in the troughs being maintained at a short distance from the underside of the bottom plates supported upon them. By this arrangement the heat from the bottom plates passes to the troughs, and also to the water in them, and by the evaporation of the water the undue heating of the said plates is prevented.

A.D. 1873, February 22.—No. 673.

ROBINSON, JOHN, of Rochdale, in the county of Lancaster, engineer, and SMITH, JOHN, of the same place, engineer.—“Improvements in machinery for sawing wood.”

This invention relates to board cutting machines, and consists in a method of mounting the saw or saws thereon.

A.D. 1873, February 22.—No. 674.

NASMITH, JOHN, of Manchester, in the county of Lancaster, mechanical engineer.—“Improvements in machinery for preparing cotton and other fibrous materials for spinning.”

This invention relates firstly to the carding engine, and consists in the adaptation thereto of an instrument of peculiar construction to the taker in.

A.D. 1873, February 22.—No. 675.

WORTHINGTON, RICHARD, of Cadeby, in the county of Leicester.—“Improvements in means or apparatus for gathering and tying up crops in sheaves.”

The invention consists in constructing a suitable framework supported on wheels to carry the apparatus for gathering and tying up crops in sheaves, with part of the cut crop or with straw, the horses to operate such machine being attached to shafts, or to a pole at the side thereof.

A.D. 1873, February 22.—No. 676.

RICHARDSON, JOHN THOMAS HADEN, of Hatton, in the county of Derby, glass manufacturer.—“Improved apparatus or means to be employed in the manufacture of tumblers, goblets, and other articles from glass.”

This invention relates more particularly to improved apparatus or means for performing that part or process of the said manufacture technically termed “rubbing.”

The improved apparatus or means consists mainly of an improved rubbing tool or “rubber” of metal or other material, and somewhat of the shape of an ordinary tumbler, having however ribs or bars (with inner flattened surfaces, and with open spaces or interstices between) projecting from its bottom (which acts as the palate hitherto in use) to its upper and wider circumference, where they are united or held firmly by a circumscribing or inner retaining rim; by the employment of which improved “rubber” great advantages are obtained in being able to see at any time when the articles are sufficiently “rubbed.”

The rubber is secured to a revolving shaft (supported by a bracket with its lower end working in a footstep), the motion of which is derived by means of a cord wound round it (or by other suitable means) so that it is quickly reversible.

The blowing tube, on which the metal is gathered from the melting pot and blown up as hitherto ready for insertion in the “rubber,” is held in position in a line with the revolving shaft by means of other brackets.

A.D. 1873, February 22.—No. 677.

CORBITT, WILLIAM, of Masbro’ Works, Rotherham, in the county of York, stove grate manufacturer.—“Improvements in stove grates.”

This invention relates to a peculiar form and arrangement of the fire box of a stove grate and consists in combining together vertical sides and a curved back composed of firebrick or other suitable material, the said curved back being made to project at its lower part into the fire space, thereby contracting such space, absorbing heat, and consequently economizing fuel. The heat absorbed by the back of the grate, which is by preference made of firebrick, is conducted to the air, which enters one or more heating chambers made behind the grate, the said air after having been heated issuing through suitable openings in the front of the grate into the apartment.

A.D. 1873, February 22.—No. 678.

DURNFORD, HUGH FRASER, of Newcastle Emlyn, in the county of Carmarthen, South Wales.—“Certain improvements in the construction and application of horse shoes.”

The novelty of the invention consists in providing horses in frosty or snowy weather with roughened supplementary shoes, which can be attached or detached at pleasure, between which and the ordinary shoes a web of leather is placed, so as to prevent the shoes bounding or filling with snow.

A.D. 1873, February 22.—No. 679.

MACDERMOTT, MARTIN, of Scott’s Chambers, 25 & 26, Pudding Lane, in the city of London, architect.—“Improvements in the method of and apparatus for perforating rock, coal, slate, & other mineral substances.”

The novelty of this invention consists, as to the first part thereof, in a new mechanical arrangement of standard to carry mechanism for perforating rock, &c., so made that it can be fixed rigidly in position to the face of the rock to be perforated or other material upon which the standard rests, and take the thrust of the perforating mechanism while the process of boring is being effected; and, secondly,

In a new mechanical arrangement of standard, also to carry mechanism for perforating rock & other mineral substances, so contrived that the same standard can be adjusted and fixed rigidly in position between rock and other bearing surfaces varying in the heights or distances between the same, thus obviating the necessity for using standards of different heights.

[No. 8.]

A.D. 1873, February 22.—No. 680.

HARGREAVES, JAMES, of Widnes, in the county of Lancaster, chemist, and ROBINSON, THOMAS, of the same place, iron founder.—“Improvements in the manufacture of sulphate of soda and sulphate of potassa.”

This relates to the production of sulphates by our direct action method.

First. Sulphates are mixed with the chlorides previous to the mass being broken into pieces.

Second. Solutions of salts of copper, zinc, manganese, or chromium, are added to the chlorides, preferably before the mass is dried, and broken into pieces.

Third. Steam or atmospheric air is employed to displace the gases contained amongst the converted finished sulphate.

A.D. 1873, February 22.—No. 681.

HASELTINE, GEORGE, of the “International Patent Office,” Southampton Buildings, London, Doctor of Laws.—(*A communication from Benjamin Franklin McCarty, engineer, Pliny F. Olds, engineer, and Franklin H. Mason, gentleman, all of Cleveland, Ohio, United States of America.*)—“An improved mode of using steam for producing perfect combustion of fuel and consuming the smoke and inflammable gases from the same.”

This invention relates to the use of steam for producing the combustion of coal and consumption of the smoke and inflammable matter eliminated from the fuel. In the consumption of coal in the ordinary furnace a large amount of combustible matter is eliminated and the same escapes from the furnace unconsumed. This escape is the result of a deficiency of oxygen in the furnace. In order to insure a complete consumption of the combustible matter eliminated in the furnace I conduct into the fire-place directly over the bed of coal a jet or jets of steam taken from the boiler.

The volume of steam used will depend upon the character and quality of the coal and the construction of the furnace.

A.D. 1873, February 22.—No. 682.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from Louis Joseph Frédéric Margueritte, of Paris, France.*)—“Improvements in the purification of syrups and sugar.”

The invention relates, 1st, to the purification of syrups from beetroot, cane, or other sugar, by the action of acids on the saccharine juices in a boiling state, either in a vacuum or otherwise.

2ndly. To the treatment of saccharine juices for extracting crystallizable sugar therefrom, preferably by the aid of sulphuric or hydrochloric acid, by boiling in a vacuum at a low temperature.

3rdly. To the use of like means for purifying molasses.

4thly. To improving first, second, and third quality sugars by like means.

A.D. 1873, February 22.—No. 683.

WARD, JOHN PRIOR, of 4, Albert Street, South Hackney, in the county of Middlesex, consulting “accountant.”—“Improvements in apparatus for sifting cinders and other substances.”

The Specification of this invention describes apparatus for sifting cinders, breeze, gravel, sand, and other substances on a large or small scale by a sieve working over two compartments, one for the larger & one for the smaller substance, or by a succession of graduated sieves one below the other & each acting in connection with separate compartments.

APPENDIX
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Abridgments open to public inspection before the expiration of the term of six months (in consequence of the Patentees having filed their Final Specifications), and also the Abridgments of Complete Specifications received from August 16 to August 22, 1873. These Abridgments will be subsequently printed in the body of the book, in order to preserve the numerical and chronological arrangement.

A.D. 1873, February 24.—No. 695.

LEE, JAMES ABRAHAM, of the Severn Engineering Works, Lydney, in the county of Gloucester.—“Improvements in boiling wood or other fibrous material for the manufacture of paper and in the treatment of the waste leys.”

This Provisional Specification describes the use of an exhaust pump to discharge the air contained in the material, and so replacing it with caustic solution. Also the addition to spent ley of acetic acid to form a valuable product and solid residue. Also the addition to spent ley of other acids, with a similar object.

A.D. 1873, February 25.—No. 696.

TOMMASI, FERDINANDO, of Paris, department of the Seine, in the Republic of France, gentleman.—“Improvements in apparatus for generating and applying force obtained by the dilatation of oil by heat, whereby such motive power is rendered not only applicable for increasing the efficiency of hydraulic presses, but to navigation, railways, and generally to replace steam power.”

This invention relates to improvements in the apparatus for generating force by means of the dilatation of oil by heat, for which the same inventor obtained Letters Patent, No. 175, A.D. 1871, and which was specially applicable for increasing the efficiency of hydraulic presses.

With the apparatus as originally patented it was necessary from time to time to stop its working to permit the engineer to substitute cold oil for the oil arrived at its maximum useful temperature; this rendered the working of the motive power engine and that of the hydraulic-press inevitably dependent upon each other, and this motive power was therefore inapplicable to dynamic works, which exact a uniform motion and a complete independence between the motive power or driving apparatus and the boiler or generator.

The improvements the subject of this invention consist of certain arrangements of generator, tubes, valves, cylinders and pistons, whereby cold oil replaces automatically and continually the hot oil which leaves the generator, cools, and returns to it again; and thereby this motive-power or “hydro-thermic-motor” becomes generally applicable and an advantageous substitute for steam in all its applications.

A.D. 1873, February 26.—No. 713.

BARLOW, JOHN ROBERT, of Bolton, in the county of Lancaster, manufacturer, and WALSH, ROBERT, of the same place, mechanic.—“Improvements in apparatus for distributing water for extinguishing fire and for other purposes.”

Our invention consists in connecting the water supply pipe to the hollow axle of a revolving creel on which the flexible hose is wound, and in connecting one end of the flexible hose to a branch pipe projecting from the hollow axle. This improved apparatus is particularly suitable for extinguishing fires in cotton mills and other large buildings, but it may also be applied for distributing water for gardening and other purposes.

A.D. 1873, February 26.—No. 721.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from John Wellby, of New Brunswick, in the Dominion of Canada.*)—“Improvements in apparatus or means for preventing the entrance of dust into railway carriages.”

[No. 8.—APP.]

(M)

This invention consists in the application of screens to the sides and ends, or to the sides only, of railway carriages at the lower part of the body of the carriage. These screens slant downwards and project outwards at their lower part, say 6 or 8 inches, and are brought as near the ground as practicable. The side screens consist of a roller blind carried in the screen frames, but the end screens may consist of thin wood or metal. These screens effectually prevent the rising of the dust to the doors and windows when travelling.

A.D. 1873, February 27.—No. 725.

WISE, WILLIAM LLOYD, of Chandos Chambers, Adelphi, in the county of Middlesex, patent agent.—(*A communication from Mr. John McFethries, director of the Kovroff Works of the Moscow and Nijni Novgorod Railway, Russia.*)—"Improvements in apparatus for cutting internal screw threads."

The improved apparatus consists essentially of a main body with sliding dies or cutters, and means for adjusting the same, so that a variety of threads and sizes of threads may be cut by the one tool. The dies or cutters have knife edges and their cutting faces are concave.

The apparatus may be provided with an index to facilitate the adjustment of the dies or cutters.

A.D. 1873, February 27.—No. 733.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from George Purvis, of the city of Bombay.*)—"Improvements in machinery or apparatus to be employed in ginning cotton."

This invention relates to a peculiar beater for cotton gins, and consists of what the inventor calls a "superficial cylindrical beater" which is composed of an arrangement of two or more washers or discs fixed on a spindle with pieces or strips of plates attached to them.

These plates are bent so as to form the part of a circle or segment. They are also slotted in parallelograms or diagonally or right or left diagonally or triangularly and may also be slotted rectangularly.

The plates are fitted or fixed on the above mentioned washers or discs with their slots or openings running right and left and are placed at a convenient distance apart in different rows and in a straight or direct line, thus forming the shape of a superficial cylinder.

The said slotted plates are about 40 inches long and will in some cases be made longer or shorter in order to facilitate the manufacturing and usage of the same.

The above named spindle is made of a square body and is round at both ends so as to attach pulleys or drums to drive it with.

A.D. 1873, February 27.—No. 734.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from George Purvis, of the city of Bombay.*)—"Improvements in machinery or apparatus to be employed in ginning cotton."

This invention relates to a peculiar direct acting revolving beater for cotton gins, which beater consists of an arrangement of knee shaped or plain ended knives or beaters.

These knives or beaters are fitted or rivetted on edgeways at right angles to and square across pieces or strips of iron of about 40 inches long more or less as the case may be, according to circumstances.

These strips containing knives or beaters are afterwards fixed to a square or hexagon bodied spindle made round at the ends, the knives projecting at right angles in different rows and in straight or direct lines.

The fixing of the knives or beaters on the sides of the spindle is so arranged that the several knives or beaters are caused to follow each other alternately, but are straight and at right angles to the spindle resembling a kind of open or close end grating.

A.D. 1873, February 28.—No. 743.

WHITEHEAD, ROBERT KAY, of Walmersley, near Bury, in the county of Lancaster, bleacher.—"Improvements in the manufacture of size."

The object of my invention is to prevent mildew in yarns, woven fabrics, and other fibrous substances or materials, and it consists in combining a certain quantity of mustard oil, or other vegetable oil, possessing similar antiseptic properties, with the farinaceous or other size, which is applied to the yarns, woven fabrics, or other fibrous substances or materials for the purpose of stiffening them.

A.D. 1873, March 5.—No. 807.

WISE, WILLIAM LLOYD, of Chandos Chambers, Adelphi, in the county of Middlesex.—(*A communication from Hugo Juengling, of Hanover, engineer.*)—"An improved air gas apparatus, with injector for the self-regulating production of gas from volatile fluids."

This invention relates to an arrangement of apparatus in which the liquid reservoir, the generator, and the air forcer are separated from each other, and an injector is used to introduce the air and ether into the generator.

A.D. 1873, March 10.—No. 848.

REIDY, JAMES, of No. 68, Kennington Road, in the county of Surrey.—"An improved pick or pickaxe for excavating, mining, and other purposes."

By the introduction of a socket head on the end of shaft of pick a taper hole passes through the head and handle, through which a cast steel blade or tools can be put and taken out at pleasure, consequently it is a great saving of time and expense, for it does away with steeling, as a number of the cast steel blades can be taken with the pick; therefore the blade being made of cast steel will resist the hardest substance, and the head or body will always remain fit for use. The shaft of pick is arranged with straps constructed so as to hold the blade in the centre, and can be worked at either end.

A.D. 1873, March 14.—No. 930.

FRANCIS, JOHN RICHARDSON, member of the firm of Richardson & Co., of Swansea, in the county of Glamorgan, merchant.—(*A communication from François Alexandre Hubert La Rue, of the city, district, and province of Quebec, Canada.*)—"Improvements in the process and machinery for separating magnetic from non-magnetic substances, and especially magnetic oxyd of iron from all foreign material."

The process and machinery consists in spreading by a hopper the material to be operated upon (magnetic iron sand or finely pulverized iron ore or similar magnetic substances) upon an endless brattice having spaces formed in it at regular intervals, and acting upon this material by a series of magnets placed side by side and extending above and over the entire width of the brattice. These magnets withdraw and separate the magnetic material from the foreign material on the brattice, and draw it against a cloth stretched under the magnets, such cloth or other suitable material being incapable of interrupting the attraction of the magnets when in contact therewith. The use of the cloth is to discharge the attracted material at regular intervals through spaces formed in the brattice into a suitable receptacle. There is a valve for regulating the supply of material from the hopper to the brattice, and this valve and the frame for the cloth is actuated at the proper times by cam projections on the brattice. Several sets of magnets may be arranged to operate in succession on the same layer of material upon the brattice, which material, after being thus acted upon, is discharged from the brattice as it passes round its forward cylinder.

A.D. 1873, March 19.—No. 1004.

CODDINGTON, THOMAS BUTLER, of Kensington Park Gardens, in the county of Middlesex, gentleman.—(*A communication from Gasherie De Witt, of Belleville, state of New Jersey, and James Fairman, of New York, state of New York, both in the United States of America.*)—"Improvements in the manufacture of materials such as blocks, slabs, pillars, tubes, and such like, suitable for building and for other purposes."

The introduction and blending of metal with stone, gravel or other hard materials mixed with cement.

A.D. 1873, August 20.—No. 2752.

KNOBLAUCH, CHARLES, of Munich, in the Kingdom of Bavaria, civil engineer.—"Improvements in furnace grates."

According to this invention furnace grates are constructed of two side frames, to which are bolted transverse bearing bars of inverted trough shaped section, having holes through them for the passage of air. Upon these bearing bars rest the ends of thin fire bars, which are constructed of a deep open triangular form, so as to give them great vertical strength. These bars are further supported in the middle of their length by transverse tie bolts connected to the side frames, which bolts pass through slotted holes formed in the lower part of the fire bars. There are two or more fire bars in the length of the grate, and each of these rests with its one end on one of the bearing bars, and with its other end on the curved end of the next fire bar, which in its turn rests on the next bearing bar.

A.D. 1873, August 20.—No. 2761.

HASELTINE, GEORGE, of the "International Patent Office," Southampton Buildings, London, Doctor of Laws.—(*A communication from Richard Lloyd, of New Orleans, Louisiana, United States of America.*)—

"An improved solvent, obtained by the distillation of crude turpentine."

The present invention consists in producing a solvent, which is a product resulting from the distillation of crude turpentine at an exceedingly low temperature, and the separation of the pyroligneous acid water therefrom while in vapour.

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 Clark, G., 286, Metallic and other vessels.
 Clark, J., 361, Railway breaks.
 Clark, W., 2583 (*App. 5.*) Propelling ships.
 Clarke, T. A. W., 108, Crimping hair.
 Claughton, H. O., 13, Cart saddles.
 Clayton, G., 148, Miners' safety lamps.
 Clean, F. Mc, 41, Raising ships.
 Clure, W. B. Mc, 13, Cart saddles.
 Cochrane, H., 1187 (*App. 40.*) Knives and forks.
 Cocker, J., 1084 (*App. 1.*) Spinning.
 Cocker, S., 664, Detaching ships' boats, engines, carriages, &c.
 Cockshott, R., 567, Oil or lubricant.
 Codd, H., 75, Bottles; 221, Tramways.
 Coddington, T. B., 1004 (*App. 8.*) Blocks, slabs, pillars, tubes, &c.
 Coignet, Son and Co., 305, Manure.
 Cole, F., 110, Air-engines.
 Colfs-Heyne, J. F., 425, Kilns.
 Collett, —, 650, Treating marine plants.
 Collier, E., 663, Domestic fire-places.
 Collins, C. U., 462, Lock and latch furniture.
 Comstock, C. C., 1283 (*App. 7.*) Sewing-machines.
 Conder, E., 32, Mechanical motive-power.
 Consterdine, J., 631, Weighing machines.
 Cook, W., 408, Suspended wheels.
 Cookerly, M., 459, Hoes.
 Cooper, J., 16, Casting metals.
 Cooper, T. P., 653, Closing and fastening railway carriage doors.
 Corbitt, W., 677, Stove grates.
 Corliss, S. G., 300, Clothes wringers.
 Coubro, T. P., 185, Ships' sails.
 Coulter, J., 159, Governors.
 Cowan, J., 500, Heating greenhouses and other buildings.
 Cowles, E., 99, Cooling candle moulds.
 Cowper, E. A., 131, Sewing boots and shoes.
 Cox, J., 214, Extracting and recovering oils, fats, &c.
 Cox, S., 214, Extracting and recovering oils, fats, &c.
 Cox, S. F., 273, Leather.
 Coxeter, J., 302, Administering nitrous oxide gas.
 Craven, T. C., 22, Ginning cotton.
 Crispin, W. H., 122, Furnaces.
 Croll, A. A., 45, Distilling liquors, &c.
 Cumming, J., 267, Feeding paper to printing and other machines.
 Curtis, F., 769 (*App. 36.*) Paper-making; 1924 (*App. 48.*) Steam-boilers and engines; 2238 (*App. 52.*) Sewing boots and shoes; 2389 (*App. 2.*) Cutting precious stones.
 Cutter, J. M., 1646 (*App. 45.*) Valves.

D.

Daelen, R., 562, Iron and steel.
 Daelen, V., 484, Wheel tyres, hoops and rings.
 Darling, W., 572, Cleaning and trimming the teeth of wheels and racks.

Davies, R. V., 210, Water waste preventers.
 Davis, C., 353, Preventing ships foundering; 354, Saving life and property at sea.
 Davis, G., 162, Ships' davits.
 Davis, J., 2353 (*App. 2.*) Tanning.
 De Boucherville, G. B., 2583 (*App. 5.*) Propelling ships.
 De Chodzko, N. F. B., 124, Steam-boilers.
 De Kercado, G. T., 104, Water meters.
 De La Rue, W. W., 639, Marking or scoring games.
 De Labarre, E., 321, Combinations of textile threads.
 De Lavillasse, —, 650, Treating marine plants.
 De Rutenberg, Baron V., 360, Explosive compounds.
 De Savignon, L. A. A., 667, Sugar.
 De Ware, A. A., 304, Umbrella and parasol frames.
 De Witt, G., 1004 (*App. 8.*) Blocks, slabs, pillars, tubes, &c.
 Deacon, H., 505, Chlorine.
 Deakin, F., 672, Puddling furnaces.
 Dean, G. W., 355, Sifting shovels.
 Dean, S., 259, Dressing mill-stones.
 Dean, W., 442, Gas regulators; 657, Raising beer and other liquids.
 Debenham, A., 502, Undershirts, flannel and other waistcoats.
 Decastro, D., 12, Wet gas meters.
 Defeher, A. A., 311, Shaping and ornamenting butter and pastry.
 Delessert, H. E., 157, Carriages.
 Demailly, G., 591, Filters; 1644 (*App. 45.*) Hydro-caloric motors.
 Den Bergh, J. Van, 8, Harness.
 Denby, W. S., 192, Gully traps; 312, Steam-boilers.
 Dennis, W., 301, Fire extinguishers, &c.
 Dennison, J. T., 530, Fire-places, flues and grates.
 Densmore, E., 668, Type writing machines.
 Deplechin, J. B., 409, Water meter and other cocks.
 Deregnaucourt, A., 103, Boots and shoes.
 Derham, T. S., 411, Kilns.
 Dick, W. B., 362, Extinguishing fires.
 Dietz, R. E., 319, Self-setting animal traps.
 Digney, J. D., 247, Railway signals.
 Digney, T. S., 247, Railway signals.
 Dixon, C., 464, Stoning raisins.
 Dixon, J., 222, Bridges and viaducts.
 Dodge, J. M., 516, Adjusting screw propellers and rudders.
 Dodge, T. A., 1901 (*App. 48.*) Hydraulic hose.
 Dolby, T. G. F., 449, Saving life at sea.
 Donath, F. A. H., 407, Cigars.
 Donisthorpe, R. F., 108, Crimping hair.
 Donoghue, J. D. O', 2420 (*App. 3.*) Tooth brushes.
 Donoghue, W. O', 2420 (*App. 3.*) Tooth brushes.
 Douds, D., 2649 (*App. 6.*) Steam pumps.
 Dougall, A. Mc, 542, Treating stable manure.
 Dougall, J. Mc, 393, Manure.
 Dougherty, W., 932 (*App. 37.*) Casting metals.
 Doury, P., 89, —Waterwheels.
 Drummond, D., 6, Casting metals.
 Du Bois, C., 1250 (*App. 40.*) Elevating apparatus.
 Du Motay, C. M. T., 328, Baryta.
 Dubreuil, V., 410, Lubricating.
 Ducomet, J., 2377 (*App. 2.*) Nets.
 Duffee, E., 1575 (*App. 44.*) Gas.
 Duke, H., 366, Axles and axle boxes.
 Duncan, G., 383, Printing.
 Dunderdale, W. J., 531, Tables.
 Dunkerley, B., 603, Felting hat bodies, &c.

Dunn, T. W., 420, Extracting impurities from wool.
 Dupuch, G. J., 33, Water gauges.
 Durnford, H. F., 678, Horse shoes.

E.

Early, J., 432, Enumerating passengers in carriages.
 Eason, G. L., 2020 (*App. 7.*) Watch-case springs and fasteners.
 Eaton, R., 26, Grinding corn.
 Eayrs, W. P., 2354 (*App. 2.*) Rotary engines.
 Edgcome, T. L. B., 1645 (*App. 4.*) Fettling furnaces.
 Edwards, E., 541, Rock boring and other engines; 2689 (*App. 7.*) Railway carriages.
 Edwards, G. W. B., 243, Manure drills.
 Edwards, J. C., 373, Preparing and cleaning cotton, &c.
 Eickemeyer, R., 76, Hats; 487, Hats.
 Eley, W. T., 369, Cartridge cases.
 Ellington, E. B., 622, Hydraulic hoists.
 Elmslie, E. W., 211, Opening cases, boxes and cans.
 Elmsley, R., 251, Railway signals.
 Emmens, S. H., 526, Railways; 576, Heating and lighting; 2108 (*App. 51.*) Signals.
 Erichsen, J., 602, Coke ovens and utilising heat.
 Ermen, G., 533, Fire grates.
 Erskine, F., 192, Gully traps; 312, Steam-boilers.
 Evans, W. N., 14, Tanning.
 Evans, W. R., 2261 (*App. 1.*) Fire-arms.

F.

Fairbairn, R., 260, Washing fibres.
 Fairbairn, Sir W., 270, Steam-boilers.
 Fairclough, H., 350, Separating flour from middlings, &c.
 Fairclough, J., 350, Separating flour from middlings, &c.
 Fairman, J., 1004 (*App. 8.*) Blocks, slabs, pillars, tubes, &c.
 Farey, B. W., 644, Valve gear of engines.
 Farnham, C. H., 668, Type writing machines.
 Farrow, C., 218, Bottle stoppers.
 Fawcett, T., 159, Governors.
 Fawcett, T. C., 471, Brick making.
 Fay, W. C., 1101 (*App. 39.*) Fibres.
 Feather, S., 265, Fire-places.
 Fennelly, R., 245, Aërial tramways.
 Fenn, A. G., 56, Signals.
 Fethries, J. Mc, 725 (*App. 8.*) Cutting screw threads.
 Field, C. M., 2389 (*App. 2.*) Cutting precious stones.
 Findlay, D. B., 619, Raising submerged bodies.
 Fisher, R. A., 2435 (*App. 3.*) Preserving iron and steel.
 Fisk, F., 1584 (*App. 44.*) Printing telegraphs.
 Fiskien, D., 497, Steam plough porters.
 Fletcher, W., 457, Propelling tramway carriages, forcing water, &c.
 Flinsch, F., 446, Packing tobacco, &c.; 461, Distributing color upon continuous lengths of paper, &c.
 Folk, J. E., 19, Dies.
 Forest, H., 247, Railway signals.
 Forrest, H. E., 610, Turning axles.

Foster, B. H., 252, Steam and other engines.
 Foster, E., 616, Fire-places.
 Foster, W., 384, Spinning.
 Foulis, W., 59, Charging and drawing retorts.
 Fowke, C., 624, Sewing-machines.
 Fowler, H., 77, Hospital beds.
 Fox, H. B., 390, Waterproof garments.
 Francis, J. R., 930 (*App. 8.*) Separating magnetic from non-magnetic substances and especially magnetic oxyd of iron from all foreign material.
 Frank, P., 2020 (*App. 7.*) Watch-case springs and fasteners.
 Freeman, H. O., 980 (*App. 38.*) Cheese.
 Fremlin, R. J., 640, Purifying casks, seasoning timber, &c.
 Frier, J., 381, Presses.
 Fuller, T., 161, Billiard cues.
 Fullicks, A. T., 477, Pavements, platforms, stairs, &c.

G.

Gabriel, J. S., 638, Sawing stone.
 Gall, C., 392, Furnaces.
 Garau and Co., 441, Railway electrical breaks.
 Gardiner, P. G., 37, Springs.
 Gardner, D., 633, Inlaid flooring; ornamenting surfaces.
 Gardner, R. W., 606, Governors.
 Garon, F., 62, Stoves.
 Garth, R. F., 145, Treating hides, cotton waste and seeds.
 Gascoyne, W., 498, D traps.
 Gaume, C., 2618 (*App. 6.*) Electro-magnetic engines.
 Gay, P., 95, Excavating minerals.
 Gedge, W. E., 104, Water meters; 202, Cocks and vent pegs; 295, clocks; 375, Blocking boots; 403, Converting a slow alternate circular motion into a rapid continuous circular motion.
 Gense, C., 130, Mattresses.
 Gercke, K. L. H., 548, Cartridges.
 George, C., 224, Barometers.
 Giacomini, L., 687 (*App. 7.*) Carding engines.
 Gibbs, G., 284, Fire-arms.
 Gibbs, H. H., 330, Driving straps and bands.
 Gibson, G., 289, Governors.
 Gibson, R. H., 119, Desks and seats.
 Giffard, P., 627, Refrigerating.
 Gilbee, W. A., 564, Nets.
 Gilchrist, W., 507, Bricks, tiles, &c.
 Gillespie, J., 1062 (*App. 38.*) Bungs and bung inserters.
 Gillespie, W. H., 559, Tramway carriage breaks.
 Girdwood, R., 314, Gas burners.
 Glen, G., 176, Railway and tramway rolling stock.
 Goddu, L., 1313 (*App. 41.*) Monitors.
 Goodman, A., 641, Furnaces.
 Goodrich, G. W., 90, Puddling furnaces.
 Goodrich, L. S., 90, Puddling furnaces.
 Goodwin, C. R., 501, Sewing machines.
 Goodwin, W., 630, Two-wheeled carriages.
 Gordon, J., 10, Envelopes.
 Goreham, W., 665, Cement kilns.
 Goueslain, A., 202, Cocks and vent pegs.
 Gould, S. L., 769 (*App. 36.*) Paper-making.
 Graham, J. C., 13, Cart saddles.

Gratton, T., 466, Railway wheels and tires.
 Gray, R. B., 1233 (*App. 40.*) Granulators.
 Greenwood, A., 666, Feeding machinery employed in the manufacture of percussion caps, cartridge cases, ferrules, &c.
 Greenwood, G., 568, Heating rooms and buildings.
 Greenwood, W., 585, Sweeping roads.
 Grey, E., 276, Microscopes.
 Grieve, T. W., 294, Theatre stages.
 Griffith, J., 2170 (*App. 52.*) Steam-boilers.
 Grigg, W., 786 (*App. 36.*) Applying electricity to cattle.
 Grindrod, J. T., 391, Raising and floating vessels, &c.
 Griswold, L., 2176 (*App. 52.*) Sewing-machines.
 Grout, W. H. J., 463, Carriage wheels.
 Grout, W. L., 465, Combination tool.
 Guattari, A., 453, Pneumatic telegraphs.
 Guernsey, J. W., 1352 (*App. 42.*) Shearing animals.
 Guerriero, A., *Comte de St. Ange*, 2184 (*App. 52.*) Horse-shoes.
 Gumpel, C. G., 9, Lowering ships' boats.
 Gutensohn, A., 258, Obtaining salt of tin and products from waste or refuse tin plate.

H.

Haas, B., jun., 2231 (*App. 52.*) Dial indicators for carriages.
 Hadfield, R., 1787 (*App. 46.*) Wheels, axles, shafts.
 Hadwen, J. W., 417, Mordanting, dyeing and printing; 470, Spinning.
 Haggett, W., 1461 (*App. 43.*) Metals.
 Haight, H. J., 966 (*App. 38.*) Artists' scrapers.
 Hale, E., 264, Rolling metals.
 Haley, S., 323, Treating hides and skins.
 Haley, S. H., 323, Treating hides and skins.
 Halfpenny, G. W., 262, Ink, incombustible paper, envelopes and books.
 Hall, J. H., 26, Grinding corn.
 Halmshaw, D., 586, Fire-places, ovens and boilers.
 Hambruch, G., 416, Railway carriages.
 Hamilton, E. C., 187, Manure.
 Hamilton, J. B., 387, Organ reed pipes.
 Hammond, H. W., 2686 (*App. 7.*) Gunpowder pile driver.
 Hampton, T., 842 (*App. 37.*) Armour plates.
 Hannart, L., 397, Ticketing shop goods, &c.
 Harding, G. E., 2064 (*App. 50.*) Furnaces.
 Hargreaves, J., 680, Sulphate of soda and sulphate of potassa.
 Harlow, B., 480, Stench traps and grids.
 Harmer, T., 335, Cleaning glass roofs.
 Harris, W. R., 419, Shuttle tops.
 Harrison, B., 32, Mechanical motive-power.
 Harrison, C., 121, Umbrellas, parasols and sunshades.
 Harrison, C. W., 1, Air-gas; 435, Air-gas; 528, Obtaining oxygen.
 Harrison, W. W., 577, Knives and forks.
 Hart, G. W., 315, Steam-boilers.
 Hartley, R., 81, Singeing yarn.
 Hartsuff, J. H., 2649 (*App. 6.*) Steam pumps.
 Harwood, I. K., 967 (*App. 38.*) Pumps.
 Haseltine, G., 13, cart saddles; 77, Hospital beds; 126, Projectiles; 128, Rolling metals; 213, White lead; 233, Washers; 259, Dressing

Haseltine, G.—*cont.*

millstones; 303, Hinges; 326, Converting cast iron into steel; 351, Torpedo launches; 459, Hoes; 516, Adjusting screw propellers and rudders; 681, Economising fuel; 806 (*App. 36.*) Lamps; 932 (*App. 37.*) Casting metals; 967 (*App. 38.*) Pumps; 1250 (*App. 40.*) Elevating apparatus; 1352 (*App. 42.*) Shearing animals; 1517 (*App. 44.*) Railway carriage-couplings; 1622 (*App. 45.*) Paper bags; 1641 (*App. 45.*) Separating liquids and substances; 2064 (*App. 50.*) Furnaces; 2212 (*App. 52.*) Sewing-machines; 2255 (*App. 1.*) Valves; 2257 (*App. 1.*) Inhaling apparatus; 2270 (*App. 1.*) Railway watering columns; 2284 (*App. 1.*) Weaving; 2287 (*App. 1.*) Reaping and mowing; 2311 (*App. 1.*) Distilling turpentine; 2353 (*App. 2.*) Tanning; 2354 (*App. 2.*) Rotary engines; 2600 (*App. 5.*) Preparing and packing water colors; 2761 (*App. 8.*) Obtaining solvent by the distillation of crude turpentine.
 Hatfull, R., 281, Preventing and removing incrustation in steam-boilers.
 Hawkins, J. G., 220, Gas.
 Haworth, G., 662, Aqueous apparatus for producing vapor.
 Haycock, S. H., 126, Projectiles.
 Hayek, —, 310, Artificial stone.
 Hays, J. J., 437, Centrifugal hydro-extracting apparatus.
 Hays, W. B., 437, Centrifugal hydro-extracting apparatus.
 Hayward, W. F., 2050 (*App. 6.*) Iron safes and fastenings.
 Heaton, R. G., 388, Fishing reels.
 Hedges, K. W., 436, Steam-boilers and engines.
 Hemingway, J., 297, Railway keys and wedges.
 Henderson, A. C., 591, Filters; 1644 (*App. 45.*) Hydro-caloric motors; 1645 (*App. 4.*) Fettling furnaces.
 Henley, T. F., 212, Meat extract.
 Henley, W. T., 254, Puddling furnaces.
 Henry, M., 33, Water gauges; 650, Treating marine plants; 651, Carding engines; 667, Sugar.
 Henson, H. H., 191, Shaping and punching iron.
 Herrick, S. K., 2185 (*App. 52.*) Sewing-machines.
 Hersey, C. H., 1233 (*App. 40.*) Granulators.
 Hersey, F. C., 1233 (*App. 40.*) Granulators.
 Hewett, S. B., 1793 (*App. 46.*) Fire-places.
 Heyne, J. F. C., 425, Kilns.
 Heyworth, E., 1890 (*App. 48.*) Steam-boilers.
 Hidden, T. B., 2600 (*App. 5.*) Preparing and packing water colors.
 Highton, H., 85, Electric telegraphs; 545, Electric telegraphs.
 Hill, J., 583, Stove grates.
 Hillmann, J. H., 90, Puddling furnaces.
 Hindley, G., 178, Dressing stone.
 Hinds, E. C., 282, Preventing accidents on railway platforms.
 Hipkins, E., 165, Iron safes.
 Hitchcock, R., 356, Lamps.
 Hodges, S. H., 1380 (*App. 42.*) Boots and shoes.
 Hodson, H. F., 93, Agricultural and horticultural implements.
 Holding, J., 419, Shuttle tips.
 Hollingworth, J., 1464 (*App. 43.*) Weaving.

Holman, S., 115, Gas retort mouthpieces, lids and fasteners; 136, Raising and lowering gas purifier lids, &c.
 Holmes, J. E., 98, Centrifugal machines and kilns.
 Holt, T. M., 531, Tables.
 Hookham, G., 240, Metallic box fastenings.
 Hookham, H. J., jun., 240, Metallic box fastenings.
 Hopkinson, J. T., 181, window fasteners.
 Horner, G., 188, Spinning.
 Horsley, T., jun., 204, Closing cartridge cases.
 Hosking, J., 343, Safety valves.
 Hough, E. J., 659, Life boats.
 Howard, E. I., 2255 (*App. 1.*) Valves.
 Howe, W. H. I., 1428 (*App. 4.*) Fruit preserving cans, &c.
 Howlett, E. J., 1622 (*App. 45.*) Paper bags.
 Huch, E. H., 288, Soup farina.
 Hugall, C. E., 177, Window fasteners.
 Hughes, E. T., 63, Towing canal boats; 321, Combinations of textile threads.
 Hughes, P., 96, Dishes and plates.
 Humber, J., 662, Aqueous apparatus for producing vapor.
 Hunt, B., 40, Printing telegraphs; 425, Kilns.
 Hunt, S., 142, Building blocks.
 Hunter, C. D., 2257 (*App. 1.*) Inhaling apparatus.
 Huntington, F. A., 1753 (*App. 46.*) Steam boilers and furnaces.
 Hutchings, A. J. H., 588, Pickling.
 Hutchinson, J., 1464 (*App. 43.*) Weaving.
 Hutchison, D., 551, Removing and preventing incrustation in boilers.
 Huxtable, J., 363, Turn-wrest ploughs.

I.

Ibbetson, J., 378, Leather.
 Imray, J., 309 Steam-boilers; 325, Heating, evaporating, distilling, &c.
 Intyre, P. Mc, 424, Sharpening chisels, &c.
 Ireland, W., 263, Wheel tyres.

J.

Jackson, J., 595, Attaching discs to ropes and preventing the slipping of ropes in passing over or round drums.
 Jackson, W., 338, Heating feed water.
 Jacobsen, F., 266, Manure.
 James, J. H., 456, Ornamenting fabrics.
 Janney, E. H., 1517 (*App. 44.*) Railway carriage-couplings.
 Jarman, H., 164, Steering ships.
 Jasper, C. E. F., 407, Cigars.
 Jaynor, A., 66, Steering and hoisting.
 Jeffs, J., 527, Ironing and glazing textile fabrics, paper, &c.
 Jelley, R. S. C., 271, Cutting tenons.
 Jensen, P., 149, Printing telegraphs; 602, Coke ovens and utilising heat; 2650 (*App. 6.*) Railroad rails.
 Jewitt, H., 55, Toys.
 John, W. H. St., 2527 (*App. 4.*) Purifying gas.
 Johnson, A. F., 371, Fire alarm and water supply apparatus.

Johnson, J. H., 18, Spinning; 43, Transmitting power; 155, Fire-arms; 247, Railway signals; 305, Manure; 319, Self-setting animal traps; 356, Lamps; 405, Liquid fuel; 406, Tin foil; 443, Combined pencil and eraser; 521, Automatic regulating valves; 522, Lawn mowers; 557, Nut blanks; 721 (*App. 8.*) Railway carriage dust screens; 733 (*App. 8.*) Ginning cotton; 734 (*App. 8.*) Ginning cotton; 1234 (*App. 40.*) Steam-engines; 1947 (*App. 48.*) Speed indicators; 2061 (*App. 50.*) Casting metals.
 Johnson, J. O., 2342 (*App. 2.*) Fluid meters.
 Johnston, J. B., 2650 (*App. 6.*) Railroad rails.
 Johnstone, J., 524, Ploughs.
 Jones, D., 372, Forcing inflammable fluid and liquid into furnaces.
 Jones, E., 386, Cartridges.
 Jones, F. L., 298, Weaving.
 Jones, H., 187, Manure.
 Jones, J. S., 283, Basting meat.
 Jones, R., 451, Safety lamps.
 Jones, R. C., 271, Cutting tenons.
 Jones, S. B., 261, Railway carriages and platforms.
 Jones, W., 118, Valves.
 Joseph, J., 440, Brooches and bouquet holders.
 Joslin, W., 341, Furnaces.
 Juengling, H., 807 (*App. 8.*) Air-gas.
 Justice, P. S., 2686 (*App. 7.*) Gunpowder pile driver.

K.

Kalmar, A., 5, Compasses.
 Kay, T. B., 379, Carding engines.
 Keighley, J., 657, Raising beer and other liquids.
 Kenyon, J., 482, Drying yarns and fabrics.
 Kenyon, J. H., 482, Drying yarns and fabrics.
 Kercado, G. T. de, 104, Water meters.
 Kershaw, H., 549, Spinning.
 Kesterton, H., 53, Rolling metals; 54, Metal telegraph posts; 253, Steam-boilers.
 Kidd, J., 520, Heating steam-boilers.
 King, J., 467, Railway platforms; 468, Repairing propeller shafts at sea.
 King, J. A., 116, Peat-fuel.
 King, J. M., 467, Railway platforms; 468, Repairing propeller shafts at sea.
 King, T. D. M., 467, Railway platforms; 468, Repairing propeller shafts at sea.
 Kininmonth, J., 102, Bakers' ovens.
 Kirkham, G. B., 444, Treadle motions.
 Kirkman, J., 200, Governors.
 Kitson, G. L., 521, Automatic regulating valves.
 Knaggs, W., 488, Fire-places.
 Knevet, A., 438, Fire grates.
 Knight, E., 806 (*App. 36.*) Lamps.
 Knight, J., 234, Umbrellas, parasols and sunshades.
 Knoblauch, C., 2752 (*App. 8.*) Furnace grates.
 Knowles, M., 105, Weaving.
 Kolb, A., 316, Ventilating closets, &c.
 Konn, S. W., 91, Electrical heat.
 Körting, E., 626, Steam jet apparatus and air condensers.
 Krausse, H., 80, Air-gas.
 Kreb, F., 1584 (*App. 44.*) Printing telegraphs.
 Kux, A., 422, Steam-boilers.

L.

- La Rue, F. A. H.*, 930 (*App. 8.*) Separating magnetic from non-magnetic substances and especially magnetic oxyd of iron from all foreign material.
- La Rue, W. W. de*, 639, Marking or scoring games.
- Laak, L. Van*, 1062 (*App. 38.*) Bungs and bung inserters.
- Labarre, E. de*, 321, Combinations of textile threads.
- Lacon, W. S.*, 186, Lowering ships' boats.
- Lafargue, A.*, 458, Oil-gas.
- Lake, W. R.*, 26, Grinding corn; 27, Cleaning horses; 79, Thread spools; 80, Air-gas; 127, Pipe-joints, elbows or couplings; 225, Fireproof vaults; 226, Fireproof safes; 227, Boots and shoes; 279, Railway breaks; 290, Refrigerating; 300, Clothes wringers; 317, Breakwaters; 371, Fire alarm and water supply apparatus; 396, Treating middlings; 441, Railway electrical breaks; 452, Valves; 454, Valves; 473, Heating steam-boilers; 540, Sewing sails, tents, tarpaulins, awnings, &c.; 558, Drilling and boring; 560, Blast furnaces; 634, Apparatus for burning liquid fuel; 635, Steam-boilers and furnaces; 1283 (*App. 7.*) Sewing-machines; 1737 (*App. 46.*) Veneers; 1770 (*App. 1.*) Traction-engines.
- Lamb, J. G.*, 340, Spinning.
- Lamb, J. W.*, 73, Knitting machines.
- Lancaster, G.*, 639, Marking or scoring games.
- Lancaster, R.*, 442, Gas regulators.
- Lanier, G. P.*, 130, Mattresses.
- Larmann, F. W.*, 2481 (*App. 4.*) Tuyeres.
- Lartigue, H.*, 247, Railway signals; 490, Railway signals.
- Larue, J.*, 172, Printing.
- Latham, B.*, 331, Manure.
- Laurette, L.*, 368, Artificial stone.
- Lavillasse, de*, 650, Treating marine plants.
- Law, J.*, 71, Carding-engines.
- Law, S.*, 71, Carding-engines.
- Lawrence, C.*, 510, Washing and cleansing clothes, &c.
- Lawrence, F. L.*, 510, Washing and cleansing clothes, &c.
- Laycock, T.*, 1078 (*App. 39.*) Sewing-machines.
- Lea, W., jun.*, 566, Roller blind movements or furniture.
- Leach, G.*, 357, Preparing and carding wool; 358, Sea fishing; 359, Preparing wool.
- Leatham, W.*, 30, Valves.
- Lecœur, E. J. J.*, 651, Carding engines.
- Lee, H.*, 2287 (*App. 1.*) Reaping and mowing.
- Lee, H. M.*, 493, Preserving ferns, plants, and grasses.
- Lee, J. A.*, 695 (*App. 8.*) Boiling fibres for paper making and treating the waste leys.
- Lee, J. H.*, 594, Steam-boilers and engines.
- Lee, R. B.*, 190, Metal telegraph posts.
- Leech, W.*, 2567 (*App. 5.*) Preserving wood from the ravages of insects.
- Leeming, T.*, 46, Bronzing and coloring paper, &c.
- Leigh, J. S.*, 15, Aërial tramways.
- Leon, W. F.*, 2057 (*App. 50.*) Hydraulic hoists.
- Levy, G. S.*, 433, Lining straw board, &c.
- Lewis, D.*, 494, Sizing and dressing machines.
- Lewis, H.*, 322, Boots and shoes.

- Lewis, J.*, 575, Fire grates and ovens.
- Lightowler, J.*, 617, Kitchen ranges.
- Lloyd, R.*, 2311 (*App. 1.*) Distilling turpentine; 2761 (*App. 8.*) Obtaining solvent by the distillation of crude turpentine.
- Loddell, G. G.*, 2061 (*App. 50.*) Casting metals.
- Lodighin, A. N.*, 91, Electrical heat.
- Longworth, T.*, 298, Weaving.
- Loo-Wauters, F. Van*, 63, Towing canal boats.
- Loryea, A. M.*, 217, Hydraulic motive-power.
- Lowe, O.*, 36, Steam-boilers.
- Lowe, S.*, 73, Knitting machines.
- Luxton, C.*, 999 (*App. 7.*) Peat machines.
- Lynde, F. G.*, 46, Bronzing and coloring paper, &c.
- Lyne, T.*, 380, Moulding bricks.
- Lyon, R.*, 523, Railway communicating apparatus.
- Lyttle, W. A.*, 52, Roofs, floors and pavements; 158, Railway chairs.

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- Maardt, J. G.*, 602, Coke ovens and utilising heat.
- McBride, T.*, 579, Gold and silver cord.
- McCarty, B. F.*, 681, Economising fuel.
- McClean, F.*, 41, Raising ships.
- McClure, W. B.*, 13, Cart-saddles.
- McDougall, A.*, 542, Treating stable manure.
- McDougall, J.*, 393, Manure.
- McFethries, J.*, 725 (*App. 8.*) Cutting internal screw threads.
- McIntyre, P.*, 424, Sharpening chisels, &c.
- McWilliams, A. S.*, 2005 (*App. 49.*) Sheep shears.
- Macauley, H.*, 92, Fire-arms.
- Macdermott, M.*, 679, Perforating rock, &c.
- Mackie, S. J.*, 445, Explosive compounds.
- Macneill, Sir J.*, 206, Tramways and carriages.
- Macneill, R.*, 184, Pavements.
- Maitre, E.*, 2010 (*App. 49.*) Covering surfaces with wood.
- Malpas, W.*, 2567 (*App. 5.*) Preserving wood from the ravages of insects.
- Mamelzer, T.*, 397, Ticketing shop goods, &c.
- Manbré, A.*, 2, Valves.
- Maquay, S. W.*, 450, Gas retorts; 511, Manure.
- Marchand, I. F. B.*, 375, Blocking boots.
- Margueritte, L. J. F.*, 682, Purifying syrups and sugar.
- Markham, R. J.*, 345, Wheels.
- Marquez, P.*, 317, Breakwaters.
- Marshall, C.*, 601, Thrashing machines.
- Marshall, H. D.*, 601, Thrashing machines.
- Marshall, J.*, 601, Thrashing machines.
- Marstrand, E.*, 592, Land rollers.
- Marsters, S.*, 536, Cooling beer and other liquids.
- Martin, B. G.*, 486, Presses; 1148 (*App. 39.*) Presses.
- Martin, C.*, 174, Spinning.
- Martin, R. E. R.*, 642, Artificial fuel.
- Martin, S. B.*, 290, Refrigerating.
- Martin, W. G.*, 642, Artificial fuel.
- Marval, H. C.*, 398, Fire-arms; 413, Fire-arms.
- Mason, F. H.*, 681, Economising fuel.
- Masourine, M. S.*, 207, Caissons.
- Masson, J. B. F.*, 406, Tin foil.
- Mathelin, P. L.*, 409, Water meter and other cocks.

- Matthews, C., 264, Rolling metals.
 Matthews, W. J., 138, Fire-arms.
 Mayers, H., 2057 (*App.* 50.) Hydraulic hoists.
 Meakin, G. F. L., 1179 (*App.* 49.) Hanging sashes and shutters.
 Mellor, W., 546, Smoothing and pressing textile fabrics.
 Mellor, W. W., 132, Cutting glass.
 Mercer, J., 647, Weaving.
 Metge, E., 710 (*App.* 6.) Preserving meat.
 Mewburn, J. C., 409, Water meter and other cocks; 410, Lubricating.
 Meylert, A. P., 213, White lead.
 Michaud, P. F., 629, Axle-boxes.
 Michelet, J. C., 403, Converting a slow alternate circular motion into a rapid continuous motion.
 Mickle, W., 803 (*App.* 36.) Smelting and puddling iron; 921 (*App.* 37.) Economising fuel; 1656 (*App.* 45.) Economising fuel.
 Middlehurst, James, 346, Potato and other root gatherers, &c.
 Middlehurst, John, 346, Potato and other root gatherers, &c.
 Middlemass, J., 306, Clerical costumes.
 Milburn, J., 483, Chimney cowls.
 Miller, E., 2689 (*App.* 7.) Railway carriages.
 Miller, S. H., 19, Dies.
 Miller, T. W., 571, Fire-arms.
 Mills, B. J. B., 431, Screw propellers.
 Mills, F., 379, Carding engines.
 Mills, J. H., 1924 (*App.* 48.) Steam-boilers and engines.
 Mills, J. L., 123, Printing.
 Milner, E., 196, Lubricating.
 Minshall, W., 603, Felting hat bodies, &c.
 Mirfield, M., 423, Combing fibres.
 Molyneux, E. L., 2600 (*App.* 5.) Preparing and packing water colors.
 Monkhouse, T. S., 123, Printing.
 Montgomery, J. A., 620, Journal boxes.
 Moody, C., 2023 (*App.* 49.) Locks.
 Mooney, J. H., 1283 (*App.* 7.) Sewing-machines.
 Moorhouse, J., 574, Fire ranges.
 Morand, A., 411, Kilns.
 Morgan-Brown, W., 612, Weaving; 687 (*App.* 7.) Carding engines; 822 (*App.* 36.) Boots and shoes; 1233 (*App.* 40.) Granulators; 1901 (*App.* 48.) Hydraulic hose.
 Morris, E. R., 29, Chartometers.
 Morris, T. S., 394, Furniture casters.
 Morton, J., 568, Heating rooms and buildings.
 Motay, C. M. T. du, 328, Baryta.
 Muirhead, L. P., 244, Speed indicators.
 Murdoch, H. H., 360, Explosive compounds.
 Myers, A. G., 127, Pipe-joints, elbows or couplings.
 Myers, S., 512, Stove grates.
- N.
- Nangle, W. C., 495, Paints.
 Napier, J., 246, Excavating under water.
 Nasmith, J., 674, Spinning.
 Naylor, M., 167, Weaving.
 Needham, J., 31, Fire-arms and cartridges.
 Negley, J. S., 431, Screw propellers.
- Neil, W., 2067 (*App.* 50.) Distilling spirituous liquors.
 Neill, J., 377, Forming sugar into blocks.
 Newcomb, W., 967 (*App.* 38.) Pumps.
 Newell, L. D., 503, Ships' berths and sofas.
 Newell, W., 514, Ornamenting tin-plate articles.
 Newton, A. V., 20, Paper-ruling machines; 257, Steam vacuum pumps; 444, Treadle motions; 553, Extension ladders; 608, Printing presses.
 Newton, W. E., 19, Dies; 28, Musical instruments; 89, Waterwheels; 90, Puddling furnaces; 256, Fire-arms; 340, Spinning.
 Nichols, F. W., 303, Hinges.
 Nichols, J., 215, Ventilating waterclosets, &c.
 Noad, J., 539, Sulphurated lead.
 Noble, G., 607, Paper pulp.
 Norman, J., 135, Clipping animals.
 Norris, J., 504, Mathematical drawing instruments.
- O.
- O'Donoghue, J. D., 2420 (*App.* 3.) Tooth brushes.
 O'Donoghue, W., 2420 (*App.* 3.) Tooth brushes.
 Oldknow, J., 24, Lace-making.
 Olds, P. F., 681, Economising fuel.
 Olley, G., 338, Heating feed water.
 Olsen, C. H. G., 149, Printing telegraphs.
 Onderdonk, J. P., 1622 (*App.* 45.) Paper bags.
 Osborn, S., 313, Forging metals.
 Osborne, D. T., 198, Self-feeding air-tight stoves.
 Osborne, J. W., 1947 (*App.* 48.) Speed indicators.
 Ostrander, J., 557, Nut blanks.
 Owen, C., 534, Communicating in trains.
 Owen, J., 160, Mine shafts and hoists.
 Owen, W., 583, Stove grates.
- P.
- Paddison, H., 193, Breakwaters, docks, piers, &c.
 Page, R. W., 107, Cutting screws.
 Paget, F. A., 5, Compasses.
 Pagliara, G., 405, Liquid fuel.
 Pain, J., 600, Signals.
 Palmer, F. A., 2618 (*App.* 6.) Electro-magnetic engines.
 Palmer, R., 198, Self feeding air-tight stoves.
 Parker, A. J., 535, Printing.
 Parker-Rhodes, C. E., 173, Illuminating clocks, names, signs, &c.
 Parkyn, J., 396, Treating middlings.
 Parlour, J. T., 25, Cabs and other vehicles; 144, Wheels for carriages.
 Parratt, G. F., 469, Life rafts.
 Pasquier, A., 295, Clocks.
 Passmore, E. G., 522, Lawn mowers.
 Paterson, J., jun., 365, Steam traps.
 Patison, J., 569, Gas, fuel, oil, &c.
 Patterson, R. H., 274, Purifying coal gas.
 Payne, A., 666, Feeding machinery employed in the manufacture of percussion caps, cartridge cases, ferrules, &c.
 Payton, W., 621, Safety and relief valves.
 Peacock, G., 364, Chain cables.
 Pearl, O., 18, Spinning.

on, W., 121, Umbrellas, parasols and sun-
des.
es, D. B., 7, Gas regulators.
ze, E. P., 109, Condensing liquefiable matters.
illy, C., 563, Filters.
ns, C. H., 128, Rolling metals.
an, C. H., 194, Metallic boxes.
sen, C., 1394 (*App.* 42.) Ships' logs.
er, C., 395, Ventilating mines, buildings, drains,
ps, &c.
opi, F., 11, Smelling bottles.
H., 43, Transmitting power.
ngton, J., 669, Heating bakers' ovens.
g, W., 480, Stench traps and grids.
C. C., 637, Pouches, cases, purses, boxes, &c.
M. P. A., 651, Carding engines.
R., 263, Wheel tyres.
r, J., 481, Lowering and raising ships' boats.
er, W., 146, Craping hair, &c.
R., 273, Leather.
F., 284, Fire-arms.
G., 389, Ornamenting gas fittings, &c.
J., 156, Fire-places.
ner, J. M., 180, Lamps.
J. N., 2270 (*App.* 1.) Railway watering
amns.
O. E., 4, Salt.
F. L., 1641 (*App.* 45.) Separating liquids and
stances.
r, B., 201, Weaving.
r, H., 224, Barometers.
r, H. T., 340, Spinning.
r, H. L., 152, Umbrellas.
ley, O., 420, Extracting impurities from wool.
W. T. C., 150, Steering ships.
e, W. H., 153, Railway signals.
on, W. R., 187, Manure.
e, A., 446, Packing tobacco, &c.; 461, Dis-
cutting color upon continuous lengths of paper,
le, C., 594, Steam-boilers and engines.
ard, G., 106, Metal tubes and bars.
pé, M., 564, Nets.
foot, F., 634, Apparatus for burning liquid
l; 635, Steam-boilers and furnaces.
e, R. S., 366, Axles and axle boxes.
homme, P. D., 490, Railway signals.
e, H. J., 245, Aërial tramways.
e, J., 233, Washers.
s, G., 733, (*App.* 8.) Ginning cotton; 734
(*p.* 8.) Ginning cotton.

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h, W. B., 141, Heating and ventilating build-
s.
el, G., 309, Steam-boilers.
J., 580, India rubber valves.
avalle, R., 150, Steering ships.

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ow, W., 297, Railway keys and wedges.
len, J. C., 519, Utilizing furnace gases.

Randolph, A., 470, Spinning.
Rawle, G., 14, Tanning.
Ray, R., 46, Bronzing and coloring paper, &c.
Raynolds, C. T., 2600 (*App.* 5.) Preparing and pack-
ing water colors.
Reckendorfer, J., 443, Combined pencil and eraser.
Redgrave, J., 223, Glass vessels.
Reed, J. H., 1052 (*App.* 38.) Pegging boots and
shoes.
Reidy, J., 848 (*App.* 8.) Pickaxes.
Reynolds, J., 489, Guiding railway engines and car-
riages.
Reynolds, J. H., 489, Guiding railway engines and
carriages.
Rhodes, C. E. P., 173, Illuminating clocks, names,
signs, &c.
Rhodes, J. H., 382, Liqueur stands.
Rich, A., 2600 (*App.* 5.) Preparing and packing
water colors.
Richards, W., 518, Charging and drawing retorts.
Richardson, J., 370, Furnaces.
Richardson, J. T. H., 676, Glass tumblers, goblets, &c.
Richardson, L., 2600 (*App.* 5.) Preparing and pack-
ing water colors.
Rickard, S., 616, Fire-places.
Riley, E., 254, Puddling furnaces.
Rippin, E. C., 2108 (*App.* 51.) Signals.
Ritchell, C. F., 558, Drilling and boring.
Ritchie, W., 584, Screw presses.
Roberts, L., 94, Railway rails.
Robertson, James, 448, Motive-power and blowing
engines.
Robertson, John, 248, Forcing, exhausting and mea-
suring air, gas, &c.
Robey, J., 230, Purifying, disinfecting and deodoris-
ing.
Robinson, J., 673, Sawing wood.
Robinson, T., 680, Sulphate of soda and sulphate of
potassa.
Robinson, W., 67, Signals.
Rochussen, T. A., 562, Iron and steel.
Roddie, J., 460, Chimney cowl.
Rogé, H. N., 237, Railway switches and points.
Rogers, H., 129, Carriages.
Rogers, J. B., 491, Signals.
Rogers, S. A., 190, Metal telegraph posts.
Rolin, E., 605, Weighing machines.
Rosa, W. V. V., 356, Lamps.
Rose, H. C., 255, Horse shoes.
Rose, W. W., 55, Toys.
Rosenfield, A., 2057 (*App.* 50.) Hydraulic hoists.
Ross, J., 2238 (*App.* 52.) Sewing boots and shoes.
Ross, L. E., 2284 (*App.* 1.) Weaving.
Roturier, J., 101, Turning the leaves of music
books.
Rowland, T. F., 1287 (*App.* 41.) Gas retorts.
Roy, J., 400, Umbrellas and parasols.
Rue, F. A. H. la, 930 (*App.* 8.) Separating magnetic
from non-magnetic substances and especially
magnetic oxyd of iron from all foreign material.
Rue, W. W. De la, 639, Marking or scoring
games.
Rutenberg, Baron V. de, 360, Explosive compounds.
Rydl, G., 82, Drying-machines; 229, Dyeing,
staining and drying animal and vegetable sub-
stances, &c.; 329, Steam-boilers, furnaces, mo-
tive-power, &c.; 376, Economising fuel, heating
feed water, &c.

Rylands, J., 817 (*App. 4.*) Straightening, measuring and cutting wire and metal rods.
 Ryle, J., jun., 2332 (*App. 2.*) Refrigerators.

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Salleron, J., 509, Corks.
 Salmon, P., 147, Gas, oil-gas engines and boilers.
 Samain, P., 1944 (*App. 48.*) Fire-arms.
 Sambrook, W., 596, Heating feed water.
 Sanders, F., 625, Communicating in trains and warming railway carriages.
 Sanders, R. D., 625, Communicating in trains and warming railway carriages.
 Sault, J., 2504 (*App. 4.*) Spreading silk.
 Savignon, L. A. A. de, 667, Sugar.
 Saville, T., 568, Heating rooms and buildings.
 Sawyer, A. F., 217, Hydraulic motive-power.
 Sawyer, W. H., 1641 (*App. 45.*) Separating liquids and substances.
 Scheidecker, C., 661, Shearing animals.
 Schenck, —, Bart., 310, Artificial stone.
 Schlesinger, W. J., 464, Stoning raisins; 465, Combination tool.
 Schmidt, H., 88, Marking timber, &c.
 Schoevers, A. T. C., 84, Trusses for hernia.
 Schofield, J., 546, Smoothing and pressing textile fabrics.
 Scholefield, R., 170, Brick making.
 Schwarz, L., 2218 (*App. 52.*) Economizing fuel.
 Schwarzenbach, V., 208, Gilding on glass.
 Scollay, G. W., 1815 (*App. 47.*) Preserving food.
 Scott, H. Y. D., 154, Treating sewage; 183, Purifying coal gas; 296, Manure; 570, Manure.
 Scott, James, 554, Combing fibres.
 Scott, John, 423, Combing fibres.
 Scott, W., 138, Fire-arms.
 Sears, H. B., 349, Dressing stone.
 Seeling, H., 79, Thread spools.
 Seiferheld, A., 103, Boots and shoes.
 Seitz, C. D. J., 197, Paper making.
 Sellers, R., 572, Cleaning and trimming the teeth of wheels and racks.
 Shakespeare, J. D., 655, Harmoniums, American organs, &c.
 Shanks, J., 199, Water supplying.
 Sharer, T., 238, Railway rolling stock.
 Sharp, J. P., 429, Steel.
 Shaw, J. (*Hull*), Heating.
 Shaw, J. (*Newcastle*), 597, Punching and shearing.
 Shaw, W., 1298 (*App. 41.*) Printing.
 Shearman, H. F., 620, Journal boxes.
 Shedd, D., 473, Heating steam-boilers; 2641 (*App. 6.*) Sewing-machines.
 Shedd, W., 1101 (*App. 39.*) Fibres.
 Shepherd, W. H., 554, Combing fibres.
 Sholl, C., 525, Atmospheric hammers.
 Shuttleworth, J., 1078 (*App. 39.*) Sewing-machines.
 Siddons, W. T., 508, Preventing the overwinding of mine skips.
 Sigourney, J. M., 356, Lamps.
 Silber, A. M., 334, Lighting and heating.
 Simmons, G. A., 652, Barometers.
 Simon, H., 412, Tubular boilers.

Sipriot, C., 479, Exhibiting advertisements.
 Skinner, G., 394, Furniture casters.
 Small, J. H., 27, Cleaning horses.
 Smith, A. H., 23, Crushing stone, &c.
 Smith, D., 1079 (*App. 39.*) Railways.
 Smith, E., 689 (*App. 7.*) Water gauges, discharging air from boilers, &c.
 Smith, G., 70, Ventilating boots and shoes.
 Smith, H., 324, Infants' feeding bottles.
 Smith, H. J., 351 Torpedo launches.
 Smith, J., 673, Sawing wood.
 Smith, J. Y., 279, Railway breaks.
 Smith, S., 352, Indicating and checking number of passengers, amounts of fares, attendances of workmen, &c.
 Smith, T. J., 124, Steam-boilers; 328, Baryta; 627, Refrigerating.
 Smith, W. B., 133, Sewing machines.
 Smith, W. W., 648, Working and stowing anchors.
 Smyth, D. Mc C., 609, Sewing machines.
 Snoeck, A., 321, Combinations of textile threads.
 Sokolnicki, J., 336, Lamps.
 Soul, M. A., 101, Turning the leaves of music books.
 Sowerbutts, A., 100, Raising ships.
 Spence, P., 50, Treating waste liquors in alum works.
 Spencer, J., 631, Weighing-machines.
 Sprague, W., 1770 (*App. 1.*) Traction-engines.
 St. Ange, Comte de, 2184 (*App. 52.*) Horse shoes.
 St. John, W. H., 2527 (*App. 4.*) Purifying gas.
 Stacy, G., 2012 (*App. 49.*) Stone cutters.
 Stanley, J. M., 628, Generating and applying heat in furnaces; 654, Utilising waste heat in flues of furnaces.
 Starkie, J., 593, Fire-places.
 Starley, J., 133, Sewing machines.
 Stead, J., 249, Rotatory engines.
 Stead, T., 291, Washing and wringing machines.
 Stebins, T., 2057 (*App. 50.*) Hydraulic hoists.
 Steer, A., 660, Stoves and fire-places.
 Steinhoff, G., 88, Marking timber, &c.
 Stell, S., 111, Consuming smoke and saving fuel.
 Stephens, L. A., 97, Bottles and corks.
 Stephens, R., 649, Locking railway signals and points.
 Stephens, W. B., 35, Paints.
 Sterling, W. H., 2022 (*App. 49.*) Preserving iron.
 Stevens, J. J. F., 658, Compensating for expansion and contraction in railway point rods, &c.
 Stevens, L., 216, Carbonic oxide.
 Stidder, J. G., 236, Water waste preventers.
 Stirling, J., 374, Railway breaks.
 Stone, J., 496, Furnace flues.
 Stone, T., 231, Carding engines.
 Stone, W. N., 608, Printing presses.
 Stoney, F. G. M., 550, Sluices or stop valves.
 Storry, A., 478, Rivetting boots and shoes.
 Strange, L., 381, Presses.
 Stroudley, W., 6, Casting metals.
 Stuart, D., 155, Fire-arms.
 Stuart, T. E., 2354 (*App. 2.*) Rotary engines.
 Sublet, A., 627, Refrigerating.
 Sudlow, W. E., 272, Steam-engines.
 Sutcliffe, W., 148, Miners' safety lamps.
 Sutton, C. W., 599, Removing acidity from ale, beer, wine, &c.
 Suzanne, P. A. L., 140, Imitation school slates, tablets, &c.

T.

, 373, Preparing and cleaning cotton, &c.
 C. Mc K., 414, Screws.
 J. L. F., 168, Treating sewage.
 H., 472, Hay and straw elevators.
 J., 430, Charging and drawing retorts.
 J. F., 1241, Presses.
 W., 482, Drying yarns and fabrics.
 C. F., 664, Detaching ships' boats, engines, &c.
 P., 490, Railway signals.
 an, J., 2255 (*App. 1.*) Valves.
 J., 299, Cutting vegetable substances.
 r, H., 313, Forging metals.
 s, M., 507, Bricks, tiles, &c.
 S. T., 612, Weaving.
 son, W. G., 42, Extracting oleaginous matters.
 oe, J., 402, Organs and harmoniums.
 es, R., 97, Bottles and corks.
 and Co., 441, Railway electrical breaks.
 J. C., 798 (*App. 36.*) Oil-gas.
 R., 348, Weaving carpets.
 si, F., 696 (*App. 8.*) Motive-power.
 J. G., 140, Imitation school slates, tablets, &c.
 W., 670, Combing fibres.
 C., 643, Stoves, fire-places, chimneys and
 on, C., 2184 (*App. 52.*) Horse-shoes.
 J. A. H., 335, Cleaning glass roofs.
 ad, W. H., 2190 (*App. 52.*) Printing oil-
 s, &c.
 F. J., 134, Cutting textile fabrics.
 G. (*Hansdworth*), 60, Venetian blinds.
 G. (*Horton*), 604, Preparing, combing and
 ing wool and other fibres.
 T., 169, Hydraulic propellers.
 W., 129, Carriages.
 n, C. H., 285, Railway signals.

U.

, 553, Extension ladders.
 B. S., 553, Extension ladders.
 W. G., 1234 (*App. 40.*) Steam-engines.
 n, S., 112, Trousers and suspenders.
 E., 56, Signals.
 th, T., 195, Doubling machines.

V.

en, G. W., 608, Printing presses.
 n Bergh, J., 8, Harness.
 ak, L., 1062 (*App. 38.*) Bungs and bung
 ers.
 Wauters, F., 63, Towing canal boats.
 eersch, A. H., 155, Fire-arms.
 n, E. P. H., 297, Railway keys and wedges;
 bearing animals; 2481 (*App. 4.*) Tuyeres.
 A. B., 581, Heating rooms and buildings.

Viault, J., 543, Railway signals.
 Vincent, W., 565, Fuel.
 Vowell, J., 289, Governors.
 Vuibert, F. N. C., 710 (*App. 6.*) Preserving meat.

W.

Waddington, H., 293, Miners' safety lamps.
 Walker, A., jun., 58, Steam-boilers.
 Waller, I., 77, Hospital beds.
 Walpole, J., 125, Double furrow ploughs.
 Walsh, R., 713 (*App. 8.*) Distributing water for ex-
 tinguishing fire, &c.
 Walton, W., 337, Rolling and drawing wire.
 Wamain, J. T. C., jun., 203, Fibres.
 Ward, J. P., 683, Sifting cinders and other sub-
 stances.
 Ware, A. A. de, 304, Umbrella and parasol frames.
 Warner, J. W., 225, Fireproof vaults; 226, Fire-
 proof safes.
 Warth, A., 1572 (*App. 44.*) Piling textile fabrics.
 Watson, A., 137, Combined thrashing machine and
 elevator.
 Watson, John, 275, Tramway points.
 Watson, Joseph, 370, Furnaces.
 Wattles, J. W., 166, Spinning.
 Wauters, F. Van L., 63, Towing canal boats.
 Webb, A. E., 728 (*App. 46.*) Candles and night-
 lights.
 Weber, J. H., 400, Umbrellas and parasols.
 Weber, L., 1270 (*App. 41.*) Galvanic batteries.
 Webster, J., 645, Applying gases to the refining of
 metals.
 Weekes, C., 209, Fire lighters.
 Weisker, B., 2092 (*App. 50.*) Ship-building.
 Wellby, J., 721 (*App. 8.*) Railway carriage dust
 screens.
 Welch, E. B., 40, Printing telegraphs.
 Welch, E. J. C., 51, Safety valves.
 Wells, R. G., 219, Theatrical and scientific exhibi-
 tions, &c.
 Werdermann, R., 474, Treating metals; 476, Purify-
 ing and refining metals and alloys.
 Western, C. R., 613, Band saws.
 Wharldale, W., 327, Bottle stoppers.
 Wheeler, H. F., 1380 (*App. 42.*) Boots and shoes.
 Whipp, J., 132, Cutting glass.
 Whitaker, R., 194, Metallic boxes.
 Whitburn, T., 48, Printing.
 White, T. H., 806 (*App. 36.*) Lamps.
 Whitehead, R. K., 743 (*App. 8.*) Size.
 Whiteman, W. T., 56, Signals.
 Whiting, G. F., 39, Window fasteners.
 Whittenbury, J. C., 21, School desks.
 Whittenbury, J. C., jun., 21, School desks.
 Whitwell, T., 86, Fire-places; 1288 (*App. 41.*)
 Stoves.
 Wier, M. A., 182, Carriage turnstiles.
 Wightman, A., 308, Horse shoes.
 Wilcox, S., 1154 (*App. 39.*) Steam-boilers.
 Wilde, H., 618, Weaving.
 Wiles, J. F., 65, Railway carriages.
 Wiley, W. E., 83, Coating metals.
 Wilkinson, J., jun., 415, Carpets.
 Wilkinson, N., 1890 (*App. 48.*) Steam-boilers.
 Willan, R., 494, Sizing and dressing machines.

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| <p>Willans, J. G., 547, Iron and steel.
 Williams, A. S. Mc, 2005 (<i>App.</i> 49.) Sheep shears.
 Williams, A. W. C., 64, Nail extractors.
 Williams, H., 268, Utilizing waste heat from coke ovens.
 Williams, M., 205, Gas.
 Willis, J. W., 1646 (<i>App.</i> 45.) Valves.
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AND TO

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Kirkman, 200.
Muirhead & Wood, 244.
Gibson & Vowell, 289.
Johnson (*Kitson & Carr*), 521.
Wood, 578.
Clark (*Gardner*), 606.

Grain and seeds (treating) :
Imray, 325.
Sears, 349.
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Grains or spent malt :
Hays & Hays, 437.

Granulating machines :
Morgan-Brown (*Hersey, Hersey & Gray*), 1233 (*App.* 40.)

Grease :
Thompson, 42.

Greenhouses. *See* "Horticulture."

Grinding, crushing and pulverising corn, grain, seeds, &c.; dressing flour :
Lake (*Eaton & Hall*), 26.
Fairclough & Fairclough, 350.
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Grinding, crushing and pulverising ores, quartz, &c. :
Smith, 23.
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Whipp & Mellor, 132.
Kay & Mills, 379.
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Haseltine (*Guernsey*), 1352 (*App.* 42.)

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Goreham, 665.

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Gun carriages. *See* "Fire-arms."

Gun cotton. *See* "Gunpowder."

Gunpowder and other explosive compounds :
Murdoch (*De Rutenberg*), 360.
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Gutta percha (treating and applying) :
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Hammers; hammering :
Hodson, 93.
Theaker & Osborn, 313.
Schlesinger (*Grout*), 465.
Sholl, 525.
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Hammers for marking or numbering timber, &c. :
Steinhoff (*Schmidt*), 88.
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Harbour lights. *See* "Lamps."

Harbours :
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Haseltine (*McClure, Graham & Cloughton*), 13.
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Wilson (*Eickemeyer*), 76.
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Healds :
Bowker, 3.

Heaters or foot warmers :
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Heating and evaporating; regulating heat :
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Boes, 34.
Croll, 45.
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Konn (*Lodighin*), 91.
Boynton & Holmes, 98.
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Silber, 334.
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Derham (*Morand*), 411.
Hunt (*Colfs-Heyne*), 425.
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Lake (*Shedd*), 473.
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Jensen (*Erichsen & Maardt*), 602.
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Stanley, 654.
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Mickle, 921 (*App.* 37.)
Whitwell, 1288 (*App.* 41.)
Henderson (*Demailly & Brun-
eaux*), 1644 (*App.* 45.)
Mickle, 1656 (*App.* 45.)
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Heating and evaporating brine. *See* "Salt."

Heating or warming buildings :

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Konn (*Lodighin*), 91.
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Hinges :

Gibson (*Andrews*), 119.
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Hoists; raising, hauling and lowering heavy bodies :

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2057 (*App.* 50.)

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Hays & Hays, 437.

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ings ; conservatories :

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Hodson, 83.

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Hot air engines. See "Air-
engines."

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Hydraulic motive-power. See
"Watervheels."

Hydraulic rams :

Smith, 23.

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Hydro-caloric motors :

Henderson (*Demaiilly & Brun-
caux*), 1644 (*App.* 45.)

Hydrocarbons. See "Oils of tar."

Hydro-extractors. See "Drying."

I.

Ice. See "Refrigerating."

Incrustation and sediment (pre-
venting). See "Oxidation."

India-rubber (treatment and ap-
plication) :

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Turton & Rogers, 129.

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"Gauges."

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entering or leaving vehicles or
public places :

Wier, 182.

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presses :

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carriages and ships :

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42.)

Johnson (*Osborne*), 1947 (*App.* 48.)

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"Governors."

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surface rate of bodies in motion :

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Indicating time occupied by drivers
of public carriages :

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Infants' feeding bottles. See
"Feeding bottles."

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ment of man."

Inks ; inking ; ink pads and
vessels :

Steinhoff (*Schmidt*), 88.

Gibson (*Andrews*), 119.

Mills & Monkhouse, 123.

Redgrave & Wright, 223.

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Invalid furniture :

Haseltine (*Waller & Fowler*), 77.

Iodine :

Henry (*Collett & De Lavillasse*),
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Jars (pickle) :

Codd, 75.

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Joining ; coupling ; joints :

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Lyttle, 52.

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Lake (*Myers*), 127.

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Pilling & Harlow, 480.

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Haseltine (*Jannay*), 1517 (*App.* 44.)

Lake (*Allen*), 1737 (*App.* 46.)

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looped fabrics :

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Lace-making :

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Newton (*Uda & Uda*), 553.

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and shades :

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Johnson (*Hitchcock, Sigouray &*

Rosa), 356.

Platt, 389.

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Clark (*Tesse, Lortigue & Prad-*

homme), 490.

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36.)

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Lavatories, wash-stands and ap-
pliances :

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from drowning :

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"Gauges."

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Magazines or cartridge holders.
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gines."

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passes."

Marking goods :

Clark (*Hannart & Mamelzer*), 397.

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"Rulers."

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"Registering."

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Pain, 600.

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other rods of metal :

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of ships; ships' logs :

Cederholm & Peterson, 1394 (*App.*
42.)

Measuring and registering the
supply of corn in stables, &c. :
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drawings, &c. *See* "Chartom-
eters."

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food."

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serving food."

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left hand) :
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Haseltine (*Hunter*), 2257.

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Henry (*Collett & De Lavillasse*), 650.
Haseltine (*Lloyd*), 2311 (*App.* 1.)

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Haseltine (*Meyler*), 213.
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Metals (annealing, tempering and
casehardening) :

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Metals (casting and moulding) :

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Ireland (*Pink*), 263.
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Haseltine (*Dougherty*), 932 (*App.*
37.)
Shaw, 1298 (*App.* 41.)
Haggett, 1461 (*App.* 43.)
Johnson (*Lobdell*), 2061 (*App.* 50.)
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Metals (coating). *See* "Coating
metals."

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metals."

Metals (forging, hammering, weld-
ing, bending and shaping) :

Henson, 191.
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Metals (smelting, reducing and refining); treating ores; obtaining iron and steel:

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Gedge (*Michelet*), 403.
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Clark (*Hove*), 1428 (*App. 4.*)

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Johnson (*Digney, Digney, Lar-tigue & Forest*), 247.
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Palmer (*Gaume*), 2618 (*App. 6.*)

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Newton (*Wolff*), 28.
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N.**Nail extractors:**

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Gilbee (*Procope*), 564.
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Haseltine (*Purdie*), 233.
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O.**Oil-cake:**

Bonneville (*Martin*), 486.

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Larue, 172.
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Tommasi, 696 (*App. 8.*)

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Johnson (*Pearl & Battles*), 18.
Glen, 176.
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Prouse & Duke, 366.
Edwards & Taft, 373.
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Mewburn (*Dubrenil*), 410.
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Thompson, 42.
Bentley & Garth, 145.
Cox & Cox, 214.
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Bentley & Garth, 145.
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Bonneville (*Martin*), 486.
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Oils of tar, mineral oils, hydro-carbons:

Thompson, 42.
Cox & Cox, 214.
Imray, 325.
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"Metals (smelting)."Ornaments; ornamenting surfaces
and articles:

Whitburn, 48.
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Boes, 34.
Konn (*Lodighin*), 91.
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Kininmonth, 102.
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ing). See "Breaks for machi-
nery."Oxidation and incrustation (pre-
venting and removing):

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Packing for engines, pumps,
valves, &c.:

Asbury, 189.
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Prince (*Flinsch*), 446.
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ardson, Molyneux & Rich*), 2600
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"Presses."Paddle wheels. See "Propelling
ships."

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CHRONOLOGICAL AND DESCRIPTIVE INDEX
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CONTAINING THE

ABRIDGMENTS OF PROVISIONAL AND COMPLETE SPECIFICATIONS

Delivered from February 23 to February 28, 1873.

A.D. 1873, February 24.—No. 684.

ROWBOTHAM, SAMUEL, operative chemist, of 24, Leighton Road, Kentish Town, London, and RICHARDSON, GEORGE, gentleman, of Chignal Hall, Chignal St. James, near Chelmsford, Essex.—“Improvements in the composition of artificial marbles, stones, and cements of every kind, in making them firmer, harder, less absorbent, and more able to bear exposure to air, water, and other influences, than hitherto, which improvements are applicable to the making of paints, and as a substitute for leather and other like fabrics.”

The use of albumen in mixing with plaster of paris or other substances, and its coagulation by heat, or by any other means capable of effecting such coagulation.

A.D. 1873, February 24.—No. 685.

CLEAVER, JAMES, of Caroline Street, Birmingham, in the county of Warwick.—“An improved metallic needle-case.”

This invention consists in the construction of a rectangular metallic case for holding needles, the same being provided at one end thereof, which is open, with one or more metallic divisions or plates whereby the packets of needles are kept separate from each other, and the insertion and removal thereof facilitated.

A.D. 1873, February 24.—No. 686.

BOLTON, FRANCIS JOHN, of 21, Grosvenor Mansions, Westminster, in the county of Middlesex, a Major in the army, and WEBBER, CHARLES EDMUND, of No. 91, Cornwall Gardens, Kensington, in the county of Middlesex, a Major of the Royal Engineers.—“An improved method of obtaining photometric measurements, and apparatus for that purpose.”

This invention relates to a method of and apparatus for obtaining photometric measurements in terms of electrical measurement.

A body, of which the electrical conductivity or resistance is altered by exposure to light is placed in an electrical circuit, in which circuit is also placed an electrometer or gauge of electrical resistance.

Light is directed on the body, and the value of this light, or the transparency or density of any translucent substance through which the light is passed is tested by the effect on the electrometer or resistance gauge.

A.D. 1873, February 24.—No. 687.

MORGAN-BROWN, WILLIAM, of the firm of Brandon and Morgan-Brown, engineers and patent agents, of 38, Southampton Buildings, London, and 13, Rue Gaillon, Paris.—(*A communication from Louis Giacomini, of Treviso, Italy.*)—“Improvements in the art of carding woolen and cotton tissues, and in the machinery for that purpose.”

This invention describes a compound carding cylinder for replacing the ordinary teazles, composed of vegetable fibres mixed with metallic wires, and also an additional cylinder composed also of vegetable fibres for the purpose of cleaning the teazle cylinder when teazles are employed.

A.D. 1873, February 24.—No. 688.

WHARTON, ALFRED, of Mirfield, in the county of York, dyer, and LISTER, THOMAS, of the same place, gentleman.—“An improved means and apparatus for raising liquids.”

[No 9.] Price 4d.

This invention is especially applicable in cases where it is necessary to raise liquids such as beer, porter, or other liquids from the cellars to upper stories through pipes, and our improvements consist in the employment of an air cylinder or vessel to contain compressed air, which is forced in by means of an ordinary air pump, connected by pipe and tap or valve to regulate the supply and pressure of air.

A.D. 1873, February 24.—No. 689.

SMITH, EDMUND, of Rochdale, in the county of Lancaster, engineer, and BRIERLEY, WILLIAM, of the same place, brass founder & finisher.—“Improvements in water guages for steam boilers, and in arrangements for discharging air from boilers, pipes, and other vessels connected therewith.”

1. It relates to glass tube water guages, and consists of an arrangement of two glass tubes in branches from a vertical metal tube, with only one set of taps for both glass tubes.

2. It relates to means for discharging air from boilers, pipes, and other vessels; and consists in a pipe having a seating at one end, which allows air to pass a fixed valve when the pipe is cold, but when heated by the passing or entering steam the pipe expands and brings its seating against the fixed valve and thus closes the outlet.

A.D. 1873, February 24.—No. 690.

HORROCKS, JAMES, of Eccles, in the county of Lancaster.—“Improvements in the boiling, scouring, or cleansing of textile fabrics and materials, and in apparatus therefor.”

The inventor places the goods in a high pressure kier, and pumps heated lye through the contents of the kier, until a suitable heat and pressure are attained. The valves are then closed and the contents remain at rest for about 12 hours.

A.D. 1873, February 24.—No. 691.

RYDILL, GEORGE, of Grove House, Dewsbury, in the county of York.—“Improvements in steam engines and boilers.”

This invention relates to improvements in combined steam engines and boilers on land and sea for more effectually consuming smoke and saving fuel.

A.D. 1873, February 24.—No. 692.

WATTS, THOMAS HODGSON, of Manchester, in the county of Lancaster.—“Improvements in apparatus for preventing the down draft and arresting the fall of soot in domestic and other chimneys, which invention is also applicable for obviating the back draft in ventilators.”

This invention applies, firstly, to the construction of chimney tops, the object of the invention being to encourage an upward draft and at the same time to prevent a down draft from wind or other external pressure. I make longitudinal or other suitable openings through the side of the chimney top or shaft, and in the interior immediately beneath each of these openings, I fix a sloping partition or louvre inclining upwards and extending over rather more than half the internal area of the shaft, the openings (and consequently the louvres) being placed alternately upon opposite sides, so that the inner edges of the louvres overlap.

A.D. 1873, February 24.—No. 693.

LEEMING, JAMES, of Pendleton, in the county of Lancaster.—“Improvements in the construction of pickers used in looms for weaving.”

This invention relates to a peculiar method of forming the picker, whereby the use of metal pins, rivets, or staples through the leg or through the foot of the picker is dispensed with.

I take a piece of hide or pelt of a sufficient length to form the whole picker in one piece and rather more than double the width of the face of the picker, and fold the two edges inwards till they meet.

On this side (which forms the inside of the picker when completed) I cut away the inner fold at each end for about three quarters of an inch. I then take a second piece of hide about four inches long, and three quarters of an inch wide, and after doubling the folded piece with the joint inwards, so that its ends come together, I bend the smaller piece double in the form of a staple and inserting its ends into the folds of the main piece, push them up into the interior of the same as far as the inner fold has been cut away, and this smaller piece thus holds the two ends together and at the same time forms the lining for the leg of the picker.

A.D. 1873, February 24.—No. 694.

ZINGLER, HENRY, of 22, Weaver's Hall, Basinghall Street, in the city of London.—(*A communication from Erwin Dubsky, of Lissitz, in the Empire of Austria.*)—"Improvements in carriage lamps."

The object of this invention is to construct carriage lamps in such a manner that in addition to throwing the light forward as heretofore, a stream of light may also be thrown downwards on to the step of the carriage or on to any other part required to be illuminated.

A.D. 1873, February 24.—No. 695.

LEE, JAMES ABRAHAM, of the Severn Engineering Works, Lydney, in the county of Gloucester.—"Improvements in boiling wood or other fibrous material for the manufacture of paper, and in the treatment of the waste leys."

This Provisional Specification describes the use of an exhaust pump to discharge the air contained in the material, and so replacing it with caustic solution. Also the addition to spent ley of acetic acid to form a valuable product and solid residue. Also the addition to spent ley of other acids, with a similar object.

A.D. 1873, February 25.—No. 696.

TOMMASI, FERDINANDO, of Paris, department of the Seine, in the Republic of France, gentleman.—"Improvements in apparatus for generating and applying force obtained by the dilatation of oil by heat, whereby such motive power is rendered not only applicable for increasing the efficiency of hydraulic presses, but to navigation, railways, and generally to replace steam power."

This invention relates to improvements in the apparatus for generating force by means of the dilatation of oil by heat, for which the same inventor obtained Letters Patent, No. 175, A.D. 1871, and which was specially applicable for increasing the efficiency of hydraulic presses.

With the apparatus as originally patented it was necessary from time to time to stop its working to permit the engineer to substitute cold oil for the oil arrived at its maximum useful temperature; this rendered the working of the motive power engine and that of the hydraulic press inevitably dependent upon each other, and this motive power was therefore inapplicable to dynamic works, which exact a uniform motion and a complete independence between the motive power or driving apparatus and the boiler or generator.

The improvements the subject of this invention consist of certain arrangements of generator, tubes, valves, cylinders and pistons, whereby cold oil replaces automatically and continually the hot oil which leaves the generator, cools, and returns to it again; and thereby this motive power or "hydro-thermic-motor" becomes generally applicable and an advantageous substitute for steam in all its applications.

A.D. 1873, February 25.—No. 697.

MARTIN, STEPHEN, of the firm of Stephen Martin, junior, and Company, of Clarence Works, Sheffield, in the county of York, iron merchants and steel converters.—"Improved construction of moulds for casting ingots."

Four side walls are enclosed within rings which are held in place by lugs and tightened up by wedges. Two of the walls have projections upon them which slip into recesses in the other two walls to obtain a parallel movement to release the ingot when the wedges are removed.

A.D. 1873, February 25.—No. 698.

LIGHTBODY, WILLIAM MARJORIBANKS, of Edinburgh, in the county of Mid Lothian, North Britain.—"Improvements in brakes applicable to carriages, wagons, or other vehicles which are used on railways, tramways, or common roadways, the same being also applicable for other purposes."

The feature of novelty which constitutes this invention is the arrangement of brakes with wedge or inclined surfaces connected by feathers and grooves, and operated by screws, levers, or their equivalent.

A.D. 1873, February 25.—No. 699.

GRISWOLD, HENRY JOSIAH, of the Hop and Malt Exchange, Southwark Street, in the county of Surrey.—"Improved apparatus to be attached to a sewing machine for embroidering, ruffling, tucking, hemming, and other like purposes."

My said invention relates to simple, cheap, and efficient apparatus, which, when properly placed and

secured on a sewing machine, will operate in combination with the stitching mechanism in the performance of various kinds of work such as embroidering, ruffling, or plaiting, tucking, hemming, and the like. The said apparatus may be adapted to any ordinary sewing machine, and is constructed to be readily applied to or removed from the same, so that the efficiency of the said machine for performing plain sewing or stitching will not be impaired.

A.D. 1873, February 25.—No. 700.

HUGHES, EDWARD THOMAS, of the firm of Hughes and Son, patent agents, 123, Chancery Lane, London.—(*A communication from Louis Grimm and Johannes Corvin, both of Magdeburg, Prussia.*)—"An improved mixture or combination of fluids to be employed as a circulating medium in pipes used for warming and heating purposes."

This invention relates to the system in which pipes filled with heated water, air, mineral oil, or other matters are used for warming buildings, heating ovens, and other purposes; and consists in using glycerine in which is dissolved chloride of lime, or similar salts or matters capable of being dissolved in glycerine.

A.D. 1873, February 25.—No. 701.

LIEBERT, JULIUS, of Kensington Park, in the county of Middlesex, merchant.—"An improved mixture of ground substances to be used as a substitute for coffee, and in the apparatus employed in the preparation thereof."

The object of this invention is to form a mixture from which a healthy and invigorating infusion can be obtained at far less cost than by any other means.

The substances are pelotas berries and coffee berries, in the proportion by weight of about three parts of the pelotas berries to one part of coffee; these berries in their green state are roasted in a coffee roaster having two compartments, separated the one from the other by a perforated partition-plate, and the pelotas berries and coffee berries are placed each in one of the said compartments, the pelotas berries during the process of roasting becoming thoroughly impregnated with the aroma of the coffee.

When roasted, the berries are ground in an ordinary grinding mill, and when well incorporated the mixture is complete and ready for use.

A.D. 1873, February 25.—No. 702.

STOCKER, ALEXANDER RICHMOND, of Liverpool Road, London.—"Improvements in caps and stoppers, and certain other articles to be employed with bottles and other vessels, and in the manufacture thereof, and in the apparatus connected therewith, part of which improvements are applicable to other purposes."

Producing caps or stoppers and other articles of desired form from clay or other material by desirably formed tools by pressure.

A.D. 1873, February 25.—No. 703.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from William Jules Samuel Grawitz, of Paris, France.*)—"An improvement in the manufacture of candles, matches, and other like articles, together with a lamp or apparatus for burning such candles."

This invention relates to the application of naphthaline—

1st. As a substitute for sulphur, wax, resin, or other inflammable materials used for dipping or impregnating matches and firelighters.

2ndly. As an addition to the phosphorus paste in which the ends of wax and other matches are dipped.

3rdly. To increase the inflammability of candles, tapers, links, and torches.

4thly. For burning in lamps in the form of a hollow candle, provided with an independent wick and double air current, the flame serving to melt the solid naphthaline to feed the wick.

A.D. 1873, February 25.—No. 704.

CHAPPELL, THOMAS, of Finsbury Park, in the county of Middlesex, plumber.—"Improvements in the manufacture of gas."

The Specification of this invention describes manufacturing gas for lighting and heating purposes from an artificial material composed of petroleum, petroleum spirit, paraffine oil, or any other suitable oil or spirit, combined with chalk, chalkstone, clunch, or other suitable earthy matter.

A.D. 1873, February 25.—No. 705.

FAWCETT, JOHN, of Kirton in Lindsey, in the county of Lincoln, cake manufacturer.—“Improvements in the treatment of peat.”

The first part of my process after obtaining the peat from the bog is to free it from all excess of moisture, which is effected by submitting it to the action of a hydro-extractor. The peat thus treated is then reduced to a granulated state and finally compressed into blocks.

A.D. 1873, February 25.—No. 706.

NEWTON, ALFRED VINCENT, of the Office for Patents, 66, Chancery Lane, in the county of Middlesex, mechanical draughtsman.—(*A communication from Charles Ferdinand Mildé and Louis Charles Vimard, both of Paris, in the Republic of France.*)—“Improvements in electric clocks.”

This invention relates to a novel arrangement of apparatus for applying electricity as the motive power to the working of clocks, and more particularly those clocks used on board ship.

A.D. 1873, February 26.—No. 707.

GERCKE, KARL LUDWIG HARTWIG, Phil. Dr. from Berlin, in Prussia, at present residing at 14, Alfred Place, Bedford Square, London.—“An improved breech-loading rifle, with a double-action, lever-mechanism.”

This new breech-loading needle-gun is constructed with a breech-block, which tightly closes the barrel behind the cartridge by a well fitting plug, and which moves backwards and forwards with a corresponding downward and upward motion of the breech, by means of a triangular double action lever-bolt that regulates every motion of the whole mechanism in such a way that the gun is made ready for firing by only three movements of the hand. *The first movement*, by pressing the lever arm quickly forwards to an angle of 60° , opens and lowers the breech sufficiently for the extractor to throw out the discharged cartridge and puts the lock at full cock; *the second motion* is to put in the new cartridge, and *the third* to draw the lever arm quickly back to its former position, leaving the lock at full cock, ready for firing, and securely protected by the surrounding wood of the stock.

The principal distinctive features of this invention are as follows:

1. The form and action of the triangular double-action lever-bolt, which regulates every motion of the mechanism by only 3 movements of the hand, at a turning angle of only 60° .
2. The tight closing of the barrel behind the cartridge by a well fitting plug, entirely excluding the possibility of any powder-gas escaping at the breech.
3. The simplicity of the lock and every other part of the mechanism, the whole containing but 6 screws, of which only two need be drawn to take all to pieces in less than a minute, while for merely taking out the breech-block and needle no screw need be drawn at all.
4. The solidity of every part of the mechanism, each piece being strong enough to stand a smart blow with a hammer.
5. The convenience of being able to examine the interior of the barrel from behind, the breech being placed low enough to pass the rod through the barrel from behind.
6. The safe handling of the gun when loaded with the lock at full cock, the lock being quite inaccessible from without, as it is placed inside the small of the butt, so that the gun is not at all liable to go off by a chance knock against the hammer.
7. The great celerity of fire, the three motions of the hand necessary to get ready for firing being so calculated that each preceding movement puts the hand into the best position for the next motion, thus giving the possibility of firing comfortably 15 to 20 rounds in a minute, without diminishing at all the time necessary for taking aim.

A.D. 1873, February 26.—No. 708.

ROBERTSON, JOHN, of Nitshill, in the county of Renfrew, North Britain.—“Improvements in generating and applying heat.”

The feature of novelty which constitutes this invention is the employment of inflammable gases mixed with oxygen or with air surcharged with oxygen, issuing from burners in the mixed state, as a source of generating and communicating heat.

A.D. 1873, February 26.—No. 709.

THOMAS, WILLIAM HENRY, of New Cross, in the county of Kent.—(*A communication from Darcy Postle, of Stanthorpe, in the Colony of Queensland, Australia.*)—"Improvements in the production of cold and in " apparatus for the same, applicable for preserving animal food, and other purposes."

This invention relates to a method of producing a diminution of temperature by alternate compression and expansion of a vapor or gas, and by the removal at the same time of the heat evolved or rendered sensible by the compression of the said vapor or gas, which when rarefied or allowed to expand abstracts heat from the matter to be cooled.

The apparatus employed consists of a vessel divided into two parts by a hollow metal partition or diaphragm through which brine or other fluid not congealable at about 30 degrees is passed to be cooled. A hollow piston is fitted to each part, which compresses the gas or vapor, the heat produced being carried off by a current of water passing through hollow covers of the piston. The vapor or gas passes through tubes to the other side of the piston, where it is allowed to expand in contact with the partition containing the liquid to be cooled, from which a quantity of heat is abstracted and absorbed by the rarefied vapor or gas. This action is repeated alternately in each part of the apparatus, the vapor or gas being forced in by a pump. The fluid thus cooled may be employed in any suitable manner, and is adapted for preserving meat on ship-board as described in the Provisional Specification.

A.D. 1873, February 26.—No. 710.

METGE, EUGÈNE, and VUIBERT, FÉLIX NICOLAS CYPRIEN, both of Boulogne sur Mer (France).—"An " improved mode or process of preserving meat."

This invention relates to a method or process of preserving meat in bulk in its fresh uncooked condition.

The animal is killed by felling and immediately skinned and cleaned. It is then glazed over with a preparation of sugar and alcohol and placed in a case in a bed of fat. The case is exhausted of air and soldered up.

A.D. 1873, February 26.—No. 711.

SHEPHERD, MARK, of Broadbent Street, Bradford, in the county of York, stone mason.—"Improved " apparatus for economising fuel for domestic or other purposes."

This invention relates to employing a cast iron plate fitted on the top of a fire place, covering the whole of the surface between the oven and boiler; holes are cast in this plate for a pan or kettle, boiler and steamer, and saucepan, and spaces left between these holes for heating a couple of irons. On the iron plate is cast a front which rests on the top bar of the fire place, in this front is cast an opening for feeding the fire.

A pipe is fixed at the back, going up the chimney, for the escape of smoke and gases. Dampers are fitted on each side of the plate communicating with the oven and boiler flues; a false bottom is also fitted half way between the bottom of the fire place and the top, and also a perforated drawer for the fall of the ashes and to keep in the cinders.

A.D. 1873, February 26.—No. 712.

HOEY, THOMAS, of Glasgow, in the county of Lanark, North Britain, engineer.—"Improved arrange- " ments or apparatus for preventing waste of water in connection with water closets, and for facilitating " the utilisation of excremental matters, and their exclusion from ordinary drains."

A measuring compartment is fitted or formed in the cistern supplying the closet, and has a small inlet valve, and a larger discharge valve, the latter communicating with the flushing pipe. The connection to the inlet valve is of such a relative length as to close the inlet valve before the discharge valve begins to open, and a spring is interposed to allow the motion of the lever to continue after the inlet valve is closed. Below the discharge valve of the measuring compartment there is a small chamber from which, in addition to the ordinary flushing pipe, there is a branch pipe fitted with a stopcock, and leading into the overflow pipe from the cistern. The overflow pipe is not led in the ordinary way into the soil pipe, so that the leakage or overflow water will not be wasted or go to increase the dilution of the excremental matters; but in the case of a series of closets in different flats of a house, the overflow pipe of each cistern above the lowest is led into the cistern of a lower closet, whilst that of the lowest is led into the drain or sewer, being

at the same time provided at any convenient point with an opening or other arrangement admitting of inspection. Each waste or drain pipe may have a small branch pipe inserted into or across it, so as to intercept and receive a small proportion of whatever liquid is passed down, such branch pipe leading into any convenient receptacle, which may be enclosed so as to be accessible only to an official inspector.

A.D. 1873, February 26.—No. 713.

BARLOW, JOHN ROBERT, of Bolton, in the county of Lancaster, manufacturer, and WALSH, ROBERT, of the same place, mechanic.—“Improvements in apparatus for distributing water for extinguishing fire “ and for other purposes.”

Our invention consists in connecting the water supply pipe to the hollow axle of a revolving creel on which the flexible hose is wound, and in connecting one end of the flexible hose to a branch pipe projecting from the hollow axle. This improved apparatus is particularly suitable for extinguishing fires in cotton mills and other large buildings, but it may also be applied for distributing water for gardening and other purposes.

A.D. 1873, February 26.—No. 714.

LANCASTER, ROBERT, of Liverpool, in the county of Lancaster, mining engineer, and SWINDELLS, ISRAEL, of Warrington, in the same county, professor of chemistry.—“Improvements applicable to steam “ boiler and other furnaces for promoting more perfect combustion of the fuel employed therein.”

The object of this invention is to promote a more perfect combustion or economisation of fuel in steam boiler and other furnaces, and consists in introducing superheated steam and air combined into such furnaces, either into the body of the incandescent fuel, or so as to meet the products of combustion emitted from the fuel, and thus to ignite those gases which would otherwise escape unconsumed into the chimney.

A.D. 1873, February 26.—No. 715.

SPENCER, GEORGE, civil engineer, of 77, Cannon Street, London, and SMITH, WALTER MACKERSIE, engineer, of Henniker Cottage, Chandos Road, Stratford, Essex.—“Improvements in the fireboxes of “ locomotive and other tubular boilers.”

1st. A method of making fireboxes in two chambers by means of a horizontal or inclined midfeather pierced with tubes, and water tubes connecting the midfeather with the crown of fire box, which midfeather and water tubes increase the heating surface and circulation.

2nd. A method of forming fire hole rings hollow, with the hollow towards the opening of fire holes, and in methods for protecting the same from friction.

A.D. 1873, February 26.—No. 716.

TALBOT, FREDERICK JOHN, of Sheffield, in the county of York, gentleman.—“Improvements in machinery for bending and punching metal plates.”

My invention relates to machinery which is chiefly adapted for the manufacture of joints for the ends of railway rails, but it can be applied for the bending of plates into any sectional form, and for the punching of the plates so bent. Between a pair of upright standards I apply four rolls, two of these rolls are horizontally supported and revolve together. By means of cog wheels the other two rolls can be simply loose rollers working on vertical shafts, supported at their bearings by strong brackets; on the bolts are placed springs. The top and bottom rolls may be supported by springs. The springs may be compressed by nuts to bear with a pressure equal to several tons on the top roll. In the slide of any ordinary punching machine I fix a steel punch, and on the bed of the machine I place a die block, shaped to the exact size of inside of web of bent plate. Between the die block and punch I support by connection with the back part of the machine a die plate; the holes in both sides must be so arranged that the punch can work through the die plate into the die block.

A.D. 1873, February 26.—No. 717.

IVORY, JAMES HARCOURT, of Birmingham, in the county of Warwick, civil engineer.—“Improvements “ in treating ‘Val-de-Travers’ rock and other like mineral substances, for the purpose of reducing the same “ to powder, and in machinery or apparatus employed for that purpose.”

According to this invention the “Val-de-Travers” or other like rock is heated to a temperature of about 300 degrees Fahrenheit by preference in the machine or apparatus hereinafter described, whereby the water

in the rock becomes volatilized, and on its liberation a complete disintegration of the rock takes place, the lumps becoming so soft and friable that by a gentle pressure the whole may be reduced to a fine powder.

The machine or apparatus to be used for pulverizing the rock consists essentially of a rotating hollow cylinder or drum surrounded by two casings. The rotating drum is heated from a furnace or furnaces, the flame and heated air from which pass into the space between the two casings. The rock being introduced into the rotating drum, the said rock is gradually and uniformly heated until it has reached the disintegrating temperature, when by the lumps rolling over one another the friable portions become detached and fall through the grating or bars of the rotating drum between a pair of plain rolls, by which the pulverizing is completed, the powder being carried from the rolls by an archimedian screw to an endless band, by which it is conveyed to a receptacle, or elsewhere conveyed.

A.D. 1873, February 26.—No. 718.

MITCHELL, JAMES, of Sheffield, in the county of York, machine knife maker.—“An improved manufacture of knives for harvesting and chaff-cutting machines.”

The invention consists in forming the knives of a combination of steel and iron, such metals being so arranged that the steel will constitute the cutting edge while the iron imparts the requisite strength and stiffness to the knife.

A.D. 1873, February 26.—No. 719.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Charles Byron Knowles and John Edward Saunders, both of Nashville, Tennessee, United States of America.*)—“Improvements in apparatus for regulating the blast of locomotive engines.”

The said invention relates to a variable exhaust blast-pipe for locomotive engines, the object being to control the blast by contracting or closing at pleasure the orifice of the blast pipe by means of a series of valves so arranged and constructed that it will by its own action free itself from any gummy or foreign matter that may form thereon.

A.D. 1873, February 26.—No. 720.

BRASSEUR, JULES, nail merchant, and WOGLER, FREDERIC, mechanic, both resident at Gosselies, in the province of Hainaut, in the Kingdom of Belgium.—“Improvements in the process of smoothing looking glasses and other glasses, which system is also applicable to crystal, porphyry, and other like materials.”

This invention consists essentially in the novel application and use to and in the smoothing or grinding of plate and other glass, crystal, porphyry, and other like substances of the material or substance known in commerce as “Levant stone,” in substitution for the more costly emery powder which has hitherto been employed for in the above mentioned process.

A.D. 1873, February 26.—No. 721.

JOHNSON, JOHN HENRY, of 47, Lincoln's Inn Fields, in the county of Middlesex, gentleman.—(*A communication from John Wellby, of New Brunswick, in the Dominion of Canada.*)—“Improvements in apparatus or means for preventing the entrance of dust into railway carriages.”

This invention consists in the application of screens to the sides and ends, or to the sides only, of railway carriages at the lower part of the body of the carriage. These screens slant downwards and project outwards at their lower part, say 6 or 8 inches, and are brought as near the ground as practicable. The side screens consist of a roller blind carried in the screen frames, but the end screens may consist of thin wood or metal. These screens effectually prevent the rising of the dust to the doors and windows when travelling.

A.D. 1873, February 26.—No. 722.

DAVEY, WILLIAM HOOK, of Islington, in the county of Middlesex.—“An improved starching and washing machine.”

The machine, which is designed for starching curtains, collars, false shirt fronts and cuffs, or other articles, consists of a vessel or receptacle containing the starch and hung in a frame on spring supports to enable it to yield under pressure on the articles. Three stampers are suspended from a cranked shaft in the

vessel, the centre one of which acts alternately with the two side ones, and flattens or spreads out the articles, while the others by a downward and lateral movement towards one another press the articles between them, thus working the starch well into the fabric.

The machine is also applicable as a washing machine.

A.D. 1873, February 26.—No. 723.

STONE, ROBERT, of Liverpool, in the county of Lancaster.—“Improvements in the means of manufacturing artificial fuel, bricks and other similar compressed articles, and in the apparatus employed therefor.”

The features of novelty which constitute this invention consist in the use of a divisioned shoot or trough which is pivoted to two strong uprights, elevated or depressed by means of a winch and chain. This shoot or trough receives the porous and fibrous ingredients used, direct from carts. It is then elevated and discharges its contents into a divisioned hopper. Underneath this hopper is a mixing wheel, and alongside is a tank containing the oil, tar or other amalgamating liquid, and underneath the tank there is a second wheel, which I term the wet mixer. These mixers are set and revolve in an inclined hopper or shoot which leads the mixed material to a moulder. The mixing wheels may be driven by any suitable mechanical means. The moulder consists of a cylinder divided on its circumference into suitable divisions or moulds to receive and mould the fuel. Revolving over the cylinder and in the same direction is a roller or compressor, which presses the fuel or material into the divisions on the cylinder. As the cylinder revolves, the compressed shapes of fuel are discharged onto a travelling table or apron, which takes the moulds clear of the cylinder.

A.D. 1873, February 27.—No. 724.

BRAY, GEORGE, of Deptford, in the county of Kent, wheelwright.—“New or improved apparatus for cleaning or clearing the trams or rails of tramways.”

This invention mainly consists of a lever, one end of which is secured to the bar (preferably extended and secured from one axle box to the other, or to one axle box only, as by this arrangement the cleaner or clearer will be kept working at some distance from the tram as the centre of the wheel maintains), and the other end of this lever is provided with an instrument similar to a plough, which may have a suitable steel tool or cutter attached, or in some cases have steel brushes secured thereto to brush dust off from the tram or rail. This plough works close to the periphery of a car wheel.

A.D. 1873, February 27.—No. 725.

WISE, WILLIAM LLOYD, of Chandos Chambers, Adelphi, in the county of Middlesex, patent agent.—(*A communication from Mr. John McFethries, director of the Kovroff Works of the Moscow and Nijni Novgorod Railway, Russia.*)—“Improvements in apparatus for cutting internal screw threads.”

The improved apparatus consists essentially of a main body with sliding dies or cutters and means for adjusting the same, so that a variety of threads and sizes of threads may be cut by the one tool. The dies or cutters have knife edges and their cutting faces are concave.

The apparatus may be provided with an index to facilitate the adjustment of the dies or cutters.

A.D. 1873, February 27.—No. 726.

BRAKELL, CHRISTOPHER, of No. 8, York Street, Manchester, in the county of Lancaster, engineer.—“Improvements in machinery and apparatus for exhausting, discharging, and transmitting air, water, or other fluids.”

The features of novelty which constitute this invention consist in :—

First. An improved construction of mine ventilator combining greater efficiency and cheapness without the large outlay generally required in stone and brick work. The air discharged by the ventilator also induces or draws other air from the mine besides that passing through the machine.

Secondly. An improved apparatus by which steam jets induce or draw air or gases from a mine, a greater efficiency being obtained than hitherto by dividing the stream of air so that the jets act on a larger surface.

Third. An improved centrifugal steam pump consisting of pump and turbine engine on one spindle, the pump disc having its suction on one side only, the construction is greatly simplified and cheapened and is more compact and easier of application.

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Fourth. An improved exhaustor and blower giving a positive pressure as in a cylinder machine so that three times the useful effect of centrifugal fans is obtained while running at probably only one tenth the speed. The machine consists of a cylinder in which are two vanes or plates half overlapping each other, the one being stationary while the other makes a revolution alternately.

Fifth. An improved exhaustor and blower for the same purpose as the above, but having only one vane or plate in the cylinder with a reciprocating circular motion, the cylinder having a stationary division from the surface of the cylinder to the boss of the moving vane or plate, and the air or fluid being drawn in and discharged on each side of the division alternately through self acting valves.

A.D. 1873, February 27.—No. 727.

LAKE, WILLIAM ROBERT, of the firm of Haseltine, Lake, & Co., patent agents, Southampton Buildings, London.—(*A communication from Seth W. Wilson, of Philadelphia, Pennsylvania, United States of America.*)—"Improvements in roller-journal-boxes."

I place around the axle journal a loose sleeve of chilled cast iron or steel. The said sleeve passes through a cast iron cage consisting of two hoops or rings connected by V-shaped cross bars between which are placed the rollers made of very hard chilled metal. The cage with the rollers and sleeve is placed in the case or box and the journal is passed through the said sleeve. On the inside of the cover I place a steel plate to receive the end thrust. The said box is provided on its outside with trunnions fitted to turn in sliding blocks which are fitted to slide vertically in grooves in the hangers.

A.D. 1873, February 27.—No. 728.

WEBB, ABSALOM ELIJAH, of No. 3, Redman's Row, Stepney, in the county of Middlesex.—"Improvements in candles and nightlights, and in the treatment of materials therefor."

This invention consists in mixing with the materials for candles and nightlights disinfecting substances such as chloride of iodine or carbolic acid crystals so that the candles or nightlights in burning will give off gases of a disinfecting character.

About one drachm of the disinfecting substance is mixed with every pound of the candle material. Scum may also be added with the disinfecting substance.

A.D. 1873, February 27.—No. 729.

GLOVER, JOHN, of No. 46, Seckforde Street, Clerkenwell, in the county of Middlesex.—"Improvements in parts of dry gas meters."

In the arrangements as generally adopted for the passage of the gas into and from the measuring compartments of dry gas meters sliding valves are employed so arranged with the passages or gratings thereof that the opening and closing of them takes place simultaneously the whole length of their passages, by which both the opening and closing of such passages is sudden, often producing unsteadiness of the lights.

The object of the invention is to remedy this evil by obtaining a gradual opening of the length of these passages or gratings by giving an inclined, curved, or other form in the direction of the length of the passages such as will ensure a progressive opening of them.

A.D. 1873, February 27.—No. 730.

JOHNSON, WILLIAM, of Sheffield, in the county of York, engineer.—"An improved grate and special method of supplying air to the fire, and heating boilers."

My invention has for its object the novel construction of a grate for boilers in combination with slotted tubes groove-shaped, for the purpose of conducting air to the fire, whereby a great heat is obtained. This arrangement is applicable to boilers of every description, namely, for stationary, portable, locomotive, or marine engine boilers; as also to puddling and reheating furnaces, and lead and copper smelting furnaces.

A.D. 1873, February 27.—No. 731.

NICHOLSON, JOHN, and NICHOLSON, THOMAS BROWN, both of Newburn, in the county of Northumberland.—"Improvements in railway buffers."

The inventors provide the buffer rod with a universal joint, preferably in the form of a semi-spherical block fixed thereon, between which block and the buffer head they place a volute or other suitable spring.

The semi-spherical block has its bearing in a corresponding cavity in the outer end of a box fixed to the end of the carriage or wagon. Upon the inner end of the buffer rod and within the said box is a nut or collar secured by a cheek nut. The interior of the box which receives the said nut or collar is of conical form, that is to say, it becomes gradually wider internally from the outer to the inner end thereof.

A.D. 1873, February 27.—No. 732.

REDMAN, JESSE GUSTAVUS, of No. 2, Railway Street, New Brompton, in the county of Kent, assayer.—“Improvements in compositions for preventing the corrosion and the fouling of ships’ bottoms or other submerged structures.”

This relates to the employment of subchloride of mercury as a base or body in combination with the usual ingredients, for the purpose of protecting the bottoms of ships and other submerged structures.

A.D. 1873, February 27.—No. 733.

JOHNSON, JOHN HENRY, of 47, Lincoln’s Inn Fields, in the county of Middlesex, gentleman.—(*A communication from George Purvis, of the city of Bombay.*)—“Improvements in machinery or apparatus to be employed in ginning cotton.”

This invention relates to a peculiar beater for cotton gins, and consists of what the inventor calls a “superficial cylindrical beater” which is composed of an arrangement of two or more washers or discs fixed on a spindle with pieces or strips of plates attached to them.

These plates are bent so as to form the part of a circle or segment. They are also slotted in parallelograms or diagonally or right or left diagonally or triangularly and may also be slotted rectangularly.

The plates are fitted or fixed on the above mentioned washers or discs with their slots or openings running right and left and are placed at a convenient distance apart in different rows and in a straight or direct line, thus forming the shape of a superficial cylinder.

The said slotted plates are about 40 inches long and will in some cases be made longer or shorter in order to facilitate the manufacturing and usage of the same.

The above named spindle is made of a square body and is round at both ends so as to attach pulleys or drums to drive it with.

A.D. 1873, February 27.—No. 734.

JOHNSON, JOHN HENRY, of 47, Lincoln’s Inn Fields, in the county of Middlesex, gentleman.—(*A communication from George Purvis, of the city of Bombay.*)—“Improvements in machinery or apparatus to be employed in ginning cotton.”

This invention relates to a peculiar direct acting revolving beater for cotton gins, which beater consists of an arrangement of knee shaped or plain ended knives or beaters.

These knives or beaters are fitted or rivetted on edgeways at right angles to and square across pieces or strips of iron of about 40 inches long more or less, as the case may be, according to circumstances.

These strips containing knives or beaters are afterwards fixed to a square or hexagon bodied spindle made round at the ends, the knives projecting at right angles in different rows and in straight or direct lines.

The fixing of the knives or beaters on the sides of the spindle is so arranged that the several knives or beaters are caused to follow each other alternately, but are straight and at right angles to the spindle resembling a kind of open or close end grating.

A.D. 1873, February 27.—No. 735.

EDISON, THOMAS ALVA, of Newark, in the state of New Jersey, United States of America.—“Improvements in circuits and instruments for chemical telegraphs.”

This invention is to increase speed on long chemical telegraph lines and render the marks clear and distinct.

The counter current set up in an electro magnet as it discharges itself upon breaking the circuit is employed in a shunt or branch to neutralize tailings. Two or more stylus or pens in main line with shunt circuit and magnet in each are also used. Drop copies are taken by a division or branch and the magnet and receiving instrument or a vessel of water into which the circuit wires are introduced.

With a very rapid circuit breaker and resistance in the main line, the transmitting instrument is placed in a circuit connecting at both sides of the resistance. An induction coil is employed as a relay for the automatic transmitting system, the same sending a secondary current to the receiving instrument or to another induction relay. Reaction batteries are introduced upon the line or in branch or shunt circuits, to clear the line of surplus electricity, the power of the same being much less than that of the main battery, and the poles opposed.

A.D. 1873, February 27.—No. 736.

JUKES, RICHARD, of Sheffield, in the county of York.—“Certain improvements in the construction of reverberating furnaces or cupolas, and in the processes connected therewith, for the purpose of smelting.”

First. The novelty of the invention consists in surrounding the lower portion of cupolas to a point above their blow pipes with an annular casing, through which cold water is caused to circulate, for the purpose of preventing the walls of the cupola being so rapidly destroyed by the heat of the molten metal.

Secondly. In blowing into cupolas employed for melting pig or scrap iron a hot blast in lieu of a cold one, as hitherto employed; and,

Thirdly. Withdrawing the gases generated in the cupola therefrom by means of a fan or other equivalent through holes or apertures formed in the cupola a little below the point where fuel and iron is fed into the same.

A.D. 1873, February 27.—No. 737.

MARSTERS, SADDLETON, of North Runcton, near Lynn, in the county of Norfolk.—“Improved means and apparatus for cooling beers and other liquids.”

This consists in submerging pipes of a diameter not exceeding one inch in a cooling trough constantly supplied, and in which the liquid is broken up into fine streams under pressure or suction.

A.D. 1873, February 28.—No. 738.

LEIGH, EVAN ARTHUR, of the city of Manchester, in the county of Lancaster, engineer.—“Certain improvements in carding engines for carding cotton, wool, silk, or other fibrous substances.”

This invention consists—

First. In arranging the rollers of carding engines so that they can be set on both sides of the engine all at once in a superior manner to that described in the Specification of my patent, dated 16th August, 1870.

Secondly. In arranging flats of carding engines so that they can all be set together on both sides of the engine at the same time, whether they be travelling or stationary self stripping flats.

Thirdly. In arranging doffers and takers in of carding engines, so that both ends may be accurately set up to the main cylinder at the same time, whereby they can always be kept parallel.

Fourthly. In dispensing with the coupling chains of travelling, self-stripping flats, and attaining greater accuracy in the flexible bend.

A.D. 1873, February 28.—No. 739.

THORNALLEY, JOSEPH, of Stickney, in the county of Lincoln, brickmaker.—“Improvements in portable combined brick and tile making machines.”

The present invention consists in the combination of a pug mill with a portable self feeding combined brick and tile making machine.

The improved machine is driven by gearing, actuated by manual and horse power.

The clay, tempered to the necessary consistency, is put in at the top of the cylinder of the pug mill, and after being cut and masticated by knives on its central shaft, is forced by the same means down through openings into alternate opposite ends of a box where it is compressed and moulded by the reciprocation of a plunger into (say) bricks at the one end and drain tiles at the other.

A.D. 1873, February 28.—No. 740.

McEVOY, CHARLES AMBROSE, of the London Ordnance Works, Bear Lane, Southwark, in the county of Surrey.—“Improvements in electric fuses.”

This provisional specification describes casting a cylinder of sulphur (or other nonconductor) around two parallel wires. The wires may be connected with a fine platina wire, which will be heated by a current

passing, or may be cut off flush with the sulphur (for sparks to pass between the unconnected ends). Over the end of the sulphur is slipped a long fulminating cap, so that the electric fuse is situated within the cap.

A.D. 1873, February 28.—No. 741.

HART, GEORGE WILLIAM, of 11, Palace Road, Upper Norwood, in the county of Surrey.—“Improvements in open fire grates.”

This provisional specification describes admitting the air through holes in the bottom and sides of the grate, and letting out the products of combustion through holes in the back. The front of the grate is lower than the back. The specification also describes other details in the construction of grates.

A.D. 1873, February 28.—No. 742.

BOTWOOD, WILLIAM, of Woodbridge Road, St. John's, Ipswich, in the county of Suffolk.—“Improvements in carriages.”

This provisional specification describes a driving rail, a breeching staple, a draft hook, and an arrangement for opening and closing the door from the driver's seat.

A.D. 1873, February 28.—No. 743.

WHITEHEAD, ROBERT KAY, of Walmersley, near Bury, in the county of Lancaster, bleacher.—“Improvements in the manufacture of size.”

The object of my invention is to prevent mildew in yarns, woven fabrics, and other fibrous substances or materials, and it consists in combining a certain quantity of mustard oil or other vegetable oil possessing similar antiseptic properties, with the farinaceous or other size, which is applied to the yarns, woven fabrics, or other fibrous substances or materials for the purpose of stiffening them.

A.D. 1873, February 28.—No. 744.

CADETT, THOMAS, of Rosherville, in the county of Kent.—“An improved artificial fuel.”

Peat, turf, or bog is combined either with tar, pitch, resin, asphaltum, or other resinous or bituminous substance, or with oil. The peat or turf is first dried by exposure or by artificial heat, and is then immersed in one or other of the above substances and submitted to pressure in moulds, to thoroughly impregnate it with the tar or other substance and express any superfluity. After being again dried it is fit for use.

A.D. 1873, February 28.—No. 745.

ENGLEDUE, WILLIAM JOHN, of Tavistock, in the county of Devon, Captain, Royal Engineers.—“Improvements in drying peat, manufactured or otherwise, and artificial fuel, applicable also to the drying of ‘kaolin’ or china clay and other like substances.”

This invention relates to a new or improved method of drying peat (manufactured or otherwise) and artificial fuel, applicable also to the drying of “kaolin” or china clay and other like substances, and consists in effecting such drying by the aid of hot water or steam pipes.

I construct a drying shed, the floor of which is composed of iron or other metal pipes placed close together or otherwise, through which I cause hot water or steam to circulate. Onto this floor the substances to be dried are either run or deposited in a liquid state, or placed thereon after being partially dried by atmospheric influence. The said metal pipes may also be arranged in any other manner in the drying shed as may be found most convenient for the expeditious drying of the substances, the essential feature of my invention being the process of drying the class of substances before mentioned by hot water or steam pipes, without reference to the particular form or arrangement of the apparatus employed.

A.D. 1873, February 28.—No. 746.

TASKER, WILLIAM, of Waterloo Iron Works, Andover, Southampton.—“Improvements in ploughs.”

This invention has for its object improvements in the head or steering part of a plough; it is applicable to any ordinary single furrow plough as well as to double ploughs or ploughs with more than two frames and turn furrows or bodies, and consists mainly in so constructing or arranging the wheels and axles of a plough as that when the plough is at work the head of the plough is kept rigid or as a fixed head plough. The axles of the land and furrow wheels are connected with a bar stump or head pin so arranged that when

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the plough is in work the bar stump or head pin inclines from an upright position by means of a lever or other suitable arrangement, the bar stump or head pin can be brought to a vertical or almost vertical position and the axles and wheels placed in another position lifting the plough frame or body clear of its work, and in this new position from the arrangement of the axles of the land and furrow wheels the bottom or portion of these wheels which rest on the ground are brought to the same level, and the plough can be easily turned at the head lands or elsewhere. By a slight adjustment of the arrangement for holding the plough head as a fixture the head can be liberated and the plough used as a swivel head plough. The advantage of this is great, as the plough can be either worked as a swivel head or as a fixed head plough as the nature of the land may require.

A.D. 1873, February 28.—No. 747.

GREEN, THOMAS, of the Phoenix Chemical Works, Ouseburn, Newcastle-on-Tyne.—“Improvements in “ apparatus for heating feed water, applicable to steam boilers and other purposes.”

The object of the invention is to adapt and apply hollow fire bars to the purpose of heating feed water by causing the water to pass through each bar successively so as to heat it to near the boiling point before it is forced or caused to pass into the steam boiler or other receptacle required.

The bars are connected at each end by connecting pieces so as to form a continuous watercourse from one to the other through the whole series from the inlet to the outlet pipe.

The water heated by its passage through the fire bars may be forced into the steam boiler direct or through the intervention of a cistern or cisterns. And the circulation of the water through the fire bars may be rendered self acting and continuous so as not to require a force pump.

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Abridgments open to public inspection before the expiration of the term of six months (in consequence of the Patentees having filed their Final Specifications), and also the Abridgments of Complete Specifications received from August 23 to August 29, 1873. These Abridgments will be subsequently printed in the body of the book, in order to preserve the numerical and chronological arrangement.

A.D. 1873, March 1.—No. 753.

WORTH, JOHN, of Rochdale, in the county of Lancaster.—“Improvements in the manufacture of washers and washer cloths used in machinery for preparing and spinning cotton and other fibrous materials.”

My improvements relate to the manufacture of the washers and washer cloths used for the purpose of giving the requisite amount of drag or friction to the bobbins employed in such machinery, and consist firstly in making the said washers convex on the upper surface, and formed of unglazed earthenware, cast iron, or rough glass.

And secondly, in weaving the said washer cloths in such a way as to leave square holes in the same at suitable distances apart, so as to avoid the necessity for punching holes through the same to admit the spindles as usually practised.

A.D. 1873, March 4.—No. 781.

HODGES, ROWLAND, the younger, of Birmingham, in the county of Warwick, brass founder.—“An improvement or improvements in the manufacture of butt hinges.”

This invention consists in manufacturing stamped butt hinges by taking blanks, having double the width of ordinary blanks, making the knuckles along one edge of the blank, and then folding or doubling the blank or flap along its middle in the direction of its length, the inner edge of the folded or doubled half of the blank or flap being presented to and pressed in contact with the open or unsupported side of the knuckles of the joint.

The several knuckles of the joint are thus supported along their whole length and so strengthened that their opening out when considerable strain is put upon them is prevented. The position of the knuckles with respect to one another is also preserved, and the flaps strengthened.

A.D. 1873, March 5.—No. 797.

RUSHTON, THOMAS HENRY, of the firm of Messieurs Dobson and Barlow, of Bolton, in the county of Lancaster, machine maker, and MORRIS, THOMAS SOUTHERN, and BROMILEY, WILLIAM ISHERWOOD of the same place, foremen.—“Improvements in machinery for preparing spinning and doubling cotton and other fibrous substances.”

Our improvements are applicable to the carding engines, for which Letters Patent were granted to George Wellman on the 11th September 1860, No. 2190, and it consists in an improved arrangement of parts for lifting and cleaning the top flats rapidly without working the rest of the machinery more rapidly than heretofore; also in a tumbler latch or other equivalent connected to the slide to enable the radial arms to be moved back at any point.

Our improvements in spinning and doubling machines consist in bringing the coping faller wire close to the yarns before the backing off commences, whereby snarls are avoided.

A.D. 1873, March 5.—No. 805.

TAYLOR, SAMUEL, of Birmingham, in the county of Warwick, zinc and galvanized iron worker.—“Improvements in constructing and fixing sheet-metal roofing.”

According to this invention, hollow ribs or projections open at bottom and provided with heads or closed tops of angular or nearly lozenge shape in cross section are made in the roofing plates, and upon the top of each rafter a dovetail or angular metal seat of a nearly triangular figure in cross section is fixed. In fixing

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the roofing plates to the roof the angular shaped heads of the hollow ribs in the said plates are engaged by a sliding motion with the fixed dovetail or angular seats on the rafters of the roof; the said plates are thereby prevented from rising vertically, their longitudinal or sliding motion being prevented by a flange on the end of each plate being nailed or screwed to the rafter. The parts used for attaching the plates expand and contract equally and the nails used are concealed and protected from the weather by the connecting parts of the roofing plates. Where the roofing plates cannot be engaged by a sliding motion with the fixed seats on the rafters, the said plates and seats are first engaged together and afterwards fixed to the rafters by nails or other fastenings passed through clips or pieces on the sides of the seats, which clips or pieces embrace the sides of the rafters.

A.D. 1873, March 8.—No. 847.

KUHLMANN, FRÉDÉRIC, of Paris, France, Professor of Chemistry.—“New utilizations of the acid residues resulting from the manufacture of chlorine.”

The invention consists, 1st, in the application of the residues of the manufacture of chlorine for the preparation of binoxide of manganese, the protoxide of manganese being superoxidized by means of ozonized air, or preferably with nitric acid or nitrous gases. 2ndly. In the application of the oxide of manganese precipitate obtained by the action of lime on the residues of the manufacture of chlorine in metallurgy.

A.D. 1873, March 19.—No. 1027.

CLARK, ALEXANDER MELVILLE, of 53, Chancery Lane, in the county of Middlesex, patent agent.—(*A communication from John Boyle, of the city, county, and state of New York, United States of America.*)—“An improved machine for sewing leather and other heavy fabrics.”

In this machine an awl is employed disposed below the face plate under the needle and presser foot, by the motion of which awl, viz., a reciprocating and an ascending and descending motion, the material is both pierced and fed to the needle, it being at same time held firm by a powerful action of the pressure bar.

The corresponding movement of the shuttle is produced by suitably constructed shuttle cranks.

With this machine a rapid sewing is effected with smooth and elegant seams instead of producing rough burrs on one side of the fabric.

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 Bentley, G. W., 145, Treating hides, cotton waste and seeds.
 Berdan, Genl. H., 398, Fire-arms; 413, Fire-arms.
 Bergh, J. Van Den, 8, Harness.
 Bernier, C. N., jun., 543, Railway signals.
 Bernstein, A., 332, Railway signals; 333, Railway switches.
 Best, J. R., 617, Kitchen ranges.
 Betteley, J. H., 238, Railway rolling stock.
 Biennait, A. A., 1348 (*App.* 42.) Ammunition, &c.
 Bingham, E. B., 608, Printing presses.
 Bingham, S. H., 608, Printing presses.
 Bischof, G., 38, Filters.
 Blake, G. F., 452, Valves; 454, Valves.
 Blake, L. R., 227, Boots and shoes.

- Blake, P. A., 342, Self-acting fire alarms.
 Blundell, G. T., 671, Lavatories; 1099 (*App. 39.*) Waterclosets.
 Blundell, J. W., 671, Lavatories; 1099 (*App. 39.*) Waterclosets.
 Blundell, T., 671, Lavatories; 1099 (*App. 39.*) Waterclosets.
 Bodin, L. B., 375, Blocking boots.
 Bodmer, L. R., 590, Artificial stone and bricks; compressing clay, coal, &c.
 Boes, J., 34, Ovens.
 Bogardus, A., 573, Hats, caps and bonnets.
 Bois, C. du, 1250 (*App. 40.*) Elevating apparatus.
 Bolton, F. J., 686, obtaining photometric measurements.
 Bolton, J. C., 39, Window fasteners.
 Bonamy, A., 2377 (*App. 2.*) Nets.
 Bonneville, H. A., 174, Spinning; 310, Artificial stone; 486, Presses; 1148 (*App. 39.*) Presses; 1348 (*App. 42.*) Ammunition, &c.; 1572 (*App. 44.*) Piling textile fabrics; 2010 (*App. 49.*) Covering surfaces with wood; 2092 (*App. 50.*) Ship-building; 2342 (*App. 2.*) Fluid meters.
 Boothroyd, B., 250, Painting venetian blinds, &c.
 Borlase, E., 269, Washing ores.
 Bottomley, W., 167, Weaving.
 Botwood, W., 742, Carriages.
 Boucherville, G. B. de, 2583 (*App. 5.*) Propelling ships.
 Bouju, M. R., 2416 (*App. 3.*) Pulp engines.
 Boundy, C., 17, Recovering zinc, &c.
 Bousfield, G. T., 980 (*App. 38.*) Cheese; 2023 (*App. 49.*) Locks; 2641 (*App. 6.*) Sewing-machines.
 Bowden, J., 399, Salt.
 Bowker, W., 3, Weaving.
 Bowra, M. E., 228, Elastic fabrics.
 Boyle, J., 1027 (*App. 9.*) Sewing leather and other heavy fabrics.
 Boynton, L. W., 98, Centrifugal machines and kilns.
 Bradley, G. A., 649, Locking railway signals and points.
 Braithwaite, J. C., 348, Weaving carpets.
 Brakell, C., 726, Exhausting, discharging and transmitting air, water and other fluids.
 Brasseur, J., 720, Smoothing plate and other glass, crystal, porphyry, &c.
 Bray, G., 724, Clearing tramway tracks.
 Bremerkamp, C., 61, Treating osier rods, &c.
 Bride, T. Mc, 579, Gold and silver cord.
 Bridges, W. G., 551, Removing and preventing incrustation in boilers.
 Brierley, W., 689, Water gauges, discharging air from boilers, &c.
 Briggs, J., 494, Sizing and dressing machines.
 Brimley, C., 235, Reaping-machines.
 Broad, J., 515, Applying poultices.
 Broel, J., 385, Air-gas.
 Bromiley, W. I., 797 (*App. 9.*) Preparing, spinning and doubling fibres.
 Brook, J., 415, Carpets.
 Brooks, J. W., 822 (*App. 36.*) Boots and shoes.
 Broomhead, G., 320, Wire.
 Brotherhood, P., 287, Propelling machinery.
 Broughton, F., 649, Locking railway signals and points.
 Broughton, J., 256, Fire-arms.
 Brown, G., 426, Horse shoes.
 Brown, R., 447, Stop valves and taps.
 Brown, W., 524, Ploughs.
 Brown, W. M., 612, Weaving; 687, Carding engines; 822 (*App. 36.*) Boots and shoes; 1233 (*App. 40.*) Granulators; 1901 (*App. 48.*) Hydraulic hose.
 Browne, J. C., 277, Propelling vessels; 636, Raising, lowering and disengaging ships' boats.
 Bruneau, L., 1644 (*App. 45.*) Hydro-caloric meters.
 Brunel-Bodin, L., 375, Blocking boots.
 Brunel-Marchand, I. F., 375, Blocking boots.
 Buckley, S. (Hyde), 44, Pipe wrenches and cutters.
 Buckley, S. (Oldham), 430, Charging and drawing retorts.
 Bull, T., 280, Washing-machines.
 Bullock, A., 171, Preventing incrustation in steam-boilers.
 Bunster, C. E. W., 15, Aërial tramways.
 Buquoy, X., 2393 (*App. 2.*) Dredging machines.
 Burdon, W., 257, Steam vacuum pumps.
 Burfitt, C., 538, Removing and preventing incrustation in steam-boilers.
 Burgess, J., 307, Crochet needle handles.
 Burt, J. U., 57, Carriages.
 Burton, P., 47, Railway carriages.
 Büttgenbach, F., 560, Blast furnaces.
 Büttner, F. L. A., 412, Tubular boilers.
- C.
- Cadett, T., 744, Artificial fuel.
 Cameron, J. A., 381, Presses.
 Campbell, H., 513, Manure.
 Campbell, M., 656, Fuel.
 Campion, W. (Nottingham), 517, Turning the welts of knitted and looped fabrics.
 Campion, W. (Sneinton), 517, Turning the welts of knitted and looped fabrics.
 Canning, Sir S., 120, Ships' telegraphic apparatus.
 Capewell, G. J., 64, Nail extractors.
 Cardon-Wamain, J. T., jun., 203, Fibres.
 Cardozo, H. G., 492, Horse shoes.
 Carmichael, H., 72, Bleaching, dyeing and washing.
 Carmichael, W. S., 589, Ships and vessels.
 Carr, D. A., 344, Railway signals.
 Carr, G. W., 521, Automatic regulating valves.
 Carrington, W. T. H., 156, Fire-places; 427, Preventing the slipping of boxes or carriages used in wire-rope transport.
 Carty, B. F. Mc, 681, Economising fuel.
 Cathcart, J. L., 431, Screw propellers.
 Caton, J., 646, Fire-places.
 Caton, J. B., 401, Pipe and cigar lighters.
 Cattell, T., 587, Purifying gutta percha.
 Cederholm, H. S., 1394 (*App. 42.*) Ships' logs.
 Chadwick, T. H., 430, Charging and drawing retorts.
 Chamberlain, H., 623, Mortar, beton and concrete.
 Chambers, R., 418, Cleaning wheat and other grain.
 Chanel, C., 614, Fuel.
 Chantrell, G. F., 499, Storing, cleansing and removing house refuse, &c.
 Chapman, E. R., 434, Sewing-machines.
 Chapman, L., 2281 (*App. 1.*) Rotary pumps.
 Chappell, A., 555, Carding engines.

Chappell, T., 704, Oil-gas.
 Charlesworth, G., 114, Weaving.
 Charlsworth, J., 555, Carding engines.
 Cheetham, J., 475, Combing machines.
 Chislett, J. R., 87, Medical electricity.
 Chodzko, N. F. B. de, 124, Steam-boilers.
 Clark, A., 278, Metallic revolving shutters.
 Clark, A. M., 109, Condensing liquefiable matters;
 189, Velocipedes; 237, Railway switches and
 points; 320, Wire; 355, Sifting shovels; 368,
 Artificial stone; 397, Ticketing shop goods, &c.;
 433, Lining straw board, &c.; 490, Railway sig-
 nals; 501, Sewing-machines; 606, Governors;
 682, Purifying syrups and sugar; 703, Candles,
 matches, fire lighters, &c.; 999 (*App. 7.*) Peat
 machines; 1027 (*App. 9.*) Sewing leather and
 other heavy fabrics; 1241 (*App. 3.*) Presses;
 1428 (*App. 4.*) Fruit preserving cans, &c.; 2012
 (*App. 49.*) Stone cutters; 2190 (*App. 52.*) Printing
 oil-cloth, &c.; 2420 (*App. 3.*) Tooth brushes.
 Clark, E., 611, Raising and lowering ships.
 Clark, G., 286, Metallic and other vessels.
 Clark, J., 361, Railway breaks.
 Clark, W., 2583 (*App. 5.*) Propelling ships.
 Clarke, T. A. W., 108, Crimping hair.
 Claughton, H. O., 13, Cart saddles.
 Clayton, G., 148, Miners' safety lamps.
 Clean, F. Mc, 41, Raising ships.
 Cleaver, J., 685, Metallic needle cases.
 Clure, W. B. Mc, 13, Cart saddles.
 Cochrane, H., 1187 (*App. 40.*) Knives and forks.
 Cocker, J., 1084 (*App. 1.*) Spinning.
 Cocker, S., 664, Detaching ships' boats, engines,
 carriages, &c.
 Cockshott, R., 567, Oil or lubricant.
 Codd, H., 75, Bottles; 221, Tramways.
 Coddington, T. B., 1004 (*App. 8.*) Blocks, slabs,
 pillars, tubes, &c.
 Coignet, Son and Co., 305, Manure.
 Cole, F., 110, Air-engines.
 Colfs-Heyne, J. F., 425, Kilns.
 Collett, —, 650, Treating marine plants.
 Collier, E., 663, Domestic fire-places.
 Collins, C. U., 462, Lock and latch furniture.
 Comstock, C. C., 1283 (*App. 7.*) Sewing-machines.
 Conder, E., 32, Mechanical motive-power.
 Consterdine, J., 631, Weighing machines.
 Cook, W., 408, Suspended wheels.
 Cookerly, M., 459, Hoes.
 Cooper, J., 16, Casting metals.
 Cooper, T. P., 653, Closing and fastening railway
 carriage doors.
 Corbitt, W., 677, Stove grates.
 Corliss, S. G., 300, Clothes wringers.
 Corrin, J., 700, Warming buildings, heating ovens, &c.
 Coulbro, T. P., 185, Ships' sails.
 Coulter, J., 159, Governors.
 Cowan, J., 500, Heating greenhouses and other
 buildings.
 Cowles, E., 99, Cooling candle moulds.
 Cowper, E. A., 131, Sewing boots and shoes.
 Cox, J., 214, Extracting and recovering oils, fats, &c.
 Cox, S., 214, Extracting and recovering oils, fats, &c.
 Cox, S. F., 273, Leather.
 Coxeter, J., 302, Administering nitrous oxide gas.
 Craven, T. C., 22, Ginning cotton.
 Crispin, W. H., 122, Furnaces.
 Croll, A. A., 45, Distilling liquors, &c.

Cumming, J., 267, Feeding paper to printing and
 other machines.
 Curtis, F., 769 (*App. 36.*) Paper-making; 1924
 (*App. 48.*) Steam-boilers and engines; 2238
 (*App. 52.*) Sewing boots and shoes; 2389 (*App.*
 2.) Cutting precious stones.
 Cutter, J. M., 1646 (*App. 45.*) Valves.

D.

Daelen, R., 562, Iron and steel.
 Daelen, V., 484, Wheel tyres, hoops and rings.
 Darling, W., 572, Cleaning and trimming the teeth
 of wheels and racks.
 Davey, W. H., 722, Starching and washing ma-
 chine.
 Davies, R. V., 210, Water waste preventers.
 Davis, C., 353, Preventing ships foundering; 354,
 Saving life and property at sea.
 Davis, G., 162, Ships' davits.
 Davis, J., 2353 (*App. 2.*) Tanning.
 De Boucherville, G. B., 2583 (*App. 5.*) Propelling
 ships.
 De Chodzko, N. F. B., 124, Steam-boilers.
 De Kercado, G. T., 104, Water meters.
 De La Rue, W. W., 639, Marking or scoring games.
 De Labarre, E., 321, Combinations of textile threads.
 De Lavillasse, —, 650, Treating marine plants.
 De Rutenberg, Baron V., 360, Explosive compounds.
 De Savignon, L. A. A., 667, Sugar.
 De Ware, A. A., 304, Umbrella and parasol frames.
 De Witt, G., 1004 (*App. 8.*) Blocks, slabs, pillars,
 tubes, &c.
 Deacon, H., 505, Chlorine.
 Deakin, F., 672, Puddling furnaces.
 Dean, G. W., 355, Sifting shovels.
 Dean, S., 259, Dressing mill-stones.
 Dean, W., 442, Gas regulators; 657, Raising beer
 and other liquids.
 Debenham, A., 502, Undershirts, flannel and other
 waistcoats.
 Decastro, D., 12, Wet gas meters.
 Defeher, A. A., 311, Shaping and ornamenting
 butter and pastry.
 Delessert, H. E., 157, Carriages.
 Demailly, G., 591, Filters; 1644 (*App. 45.*) Hydro-
 caloric motors.
 Den Bergh, J. Van, 8, Harness.
 Denby, W. S., 192, Gully traps; 312, Steam-boilers.
 Dennis, W., 301, Fire extinguishers, &c.
 Dennison, J. T., 530, Fire-places, flues and grates.
 Denmore, E., 668, Type writing machines.
 Deplechin, J. B., 409, Water meter and other cocks.
 Deregnacourt, A., 103, Boots and shoes.
 Derham, T. S., 411, Kilns.
 Dick, W. B., 362, Extinguishing fires.
 Dietz, R. E., 319, Self-setting animal traps.
 Digney, J. D., 247, Railway signals.
 Digney, T. S., 247, Railway signals.
 Dixon, C., 464, Stoning raisins.
 Dixon, J., 222, Bridges and viaducts.
 Dodge, J. M., 516, Adjusting screw propellers and
 rudders.
 Dodge, T. A., 1901 (*App. 48.*) Hydraulic hose.

Dolby, T. G. F., 449, Saving life at sea.
 Donath, F. A. H., 407, Cigars.
 Donisthorpe, R. F., 108, Crimping hair.
 Donoghue, J. D. O', 2420 (*App. 3.*) Tooth brushes.
 Donoghue, W. O', 2420 (*App. 3.*) Tooth brushes.
 Douds, D., 2649 (*App. 6.*) Steam pumps.
 Dougall, A. Mc, 542, Treating stable manure.
 Dougall, J. Mc, 393, Manure.
 Dougherty, W., 932 (*App. 37.*) Casting metals.
 Doury, P., 89, —Waterwheels.
 Drummond, D., 6, Casting metals.
 Du Bois, C., 1250 (*App. 40.*) Elevating apparatus.
 Du Motay, C. M. T., 328, Baryta.
 Dubreuil, V., 410, Lubricating.
 Dubsy, E., 694, Carriage lamps.
 Ducomet, J., 2377 (*App. 2.*) Nets.
 Duffee, E., 1575 (*App. 44.*) Gas.
 Duke, H., 366, Axles and axle boxes.
 Duncan, G., 383, Printing.
 Dunderdale, W. J., 531, Tables.
 Dunkerley, B., 603, Felting hat bodies, &c.
 Dunn, T. W., 420, Extracting impurities from wool.
 Dupuch, G. J., 33, Water gauges.
 Durnford, W. F., 678, Horse shoes.

E.

Early, J., 432, Enumerating passengers in carriages.
 Eason, G. L., 2020 (*App. 7.*) Watch-case springs and fasteners.
 Eaton, R., 26, Grinding corn.
 Eayrs, W. P., 2354 (*App. 2.*) Rotary engines.
 Edgcome, T. L. B., 1645 (*App. 4.*) Fetting furnaces.
 Edison, T. A., 735, Circuits and instruments for chemical telegraphs.
 Edwards, E., 541, Rock boring and other engines; 2689 (*App. 7.*) Railway carriages.
 Edwards, G. W. B., 243, Manure drills.
 Edwards, J. C., 373, Preparing and cleaning cotton, &c.
 Eickemeyer, R., 76, Hats; 487, Hats.
 Eley, W. T., 369, Cartridge cases.
 Ellington, E. B., 622, Hydraulic hoists.
 Elmslie, E. W., 211, Opening cases, boxes and cans.
 Elmsley, R., 251, Railway signals.
 Emmens, S. H., 526, Railways; 576, Heating and lighting; 2108 (*App. 51.*) Signals.
 Engledue, W. J., 745, Drying peat, "kaolin," &c.
 Erichsen, J., 602, Coke ovens and utilising heat.
 Ermen, G., 533, Fire grates.
 Erskine, F., 192, Gully traps; 312, Steam-boilers.
 Evans, W. N., 14, Tanning.
 Evans, W. R., 2261 (*App. 1.*) Fire-arms.
 Evoy, C. A. Mc, 740, Electric fuses.

F.

Fairbairn, R., 260, Washing fibres.
 Fairbairn, Sir W., 270, Steam-boilers.
 Fairclough, H., 350, Separating flour from middlings, &c.
 Fairclough, J., 350, Separating flour from middlings, &c.

Fairman, J., 1004 (*App. 8.*) Blocks, slabs, pillars, tubes, &c.
 Farey, B. W., 644, Valve gear of engines.
 Farnham, C. H., 668, Type writing machines.
 Farrow, C., 218, Bottle stoppers.
 Fawcett, J., 705, Peat.
 Fawcett, T., 159, Governors.
 Fawcett, T. C., 471, Brick making.
 Fay, W. C., 1101 (*App. 39.*) Fibres.
 Feather, S., 265, Fire-places.
 Fennelly, R., 245, Aërial tramways.
 Fenn, A. G., 56, Signals.
 Fethries, J. Mc, 725, Cutting screw threads.
 Field, C. M., 2389 (*App. 2.*) Cutting precious stones.
 Findlay, D. B., 619, Raising submerged bodies.
 Fisher, R. A., 2435 (*App. 3.*) Preserving iron and steel.
 Fisk, F., 1584 (*App. 44.*) Printing telegraphs.
 Fiskien, D., 497, Steam plough porters.
 Fletcher, W., 457, Propelling tramway carriages, forcing water, &c.
 Flinsch, F., 446, Packing tobacco, &c.; 461, Distributing color upon continuous lengths of paper, &c.
 Folk, J. E., 19, Dies.
 Forest, H., 247, Railway signals.
 Forrest, H. E., 610, Turning axles.
 Foster, B. H., 252, Steam and other engines.
 Foster, E., 616, Fire-places.
 Foster, W., 384, Spinning.
 Foulis, W., 59, Charging and drawing retorts.
 Fowke, C., 624, Sewing-machines.
 Fowler, H., 77, Hospital beds.
 Fox, H. B., 390, Waterproof garments.
 Francis, J. R., 930 (*App. 8.*) Separating magnetic from non-magnetic substances and especially magnetic oxyd of iron from all foreign material.
 Frank, P., 2020 (*App. 7.*) Watch-case springs and fasteners.
 Freeman, H. O., 980 (*App. 38.*) Cheese.
 Fremlin, R. J., 640, Purifying casks, seasoning timber, &c.
 Frier, J., 381, Presses.
 Fuller, T., 161, Billiard cues.
 Fullicks, A. T., 477, Pavements, platforms, stairs, &c.

G.

Gabriel, J. S., 638, Sawing stone.
 Gall, C., 392, Furnaces.
 Garau and Co., 441, Railway electrical breaks.
 Gardiner, P. G., 37, Springs.
 Gardner, D., 633, Inlaid flooring; ornamenting surfaces.
 Gardner, R. W., 606, Governors.
 Garon, F., 62, Stoves.
 Garth, R. F., 145, Treating hides, cotton waste and seeds.
 Gascoyne, W., 498, D traps.
 Gaume, C., 2618 (*App. 6.*) Electro-magnetic engines.
 Gay, P., 95, Excavating minerals.
 Gedge, W. E., 104, Water meters; 202, Cocks and vent pegs; 295, clocks; 375, Blocking boots; 403, Converting a slow alternate circular motion into a rapid continuous circular motion.

- Gense, C.*, 130, Mattresses.
Gercke, K. L. H., 548, Cartridges; 707, Rifles.
George, C., 224, Barometers.
Giacomini, L., 687, Carding engines.
Gibbs, G., 284, Fire-arms.
Gibbs, H. H., 330, Driving straps and bands.
Gibson, G., 289, Governors.
Gibson, R. H., 119, Desks and seats.
Giffard, P., 627, Refrigerating.
Gilbee, W. A., 564, Nets.
Gilchrist, W., 507, Bricks, tiles, &c.
Gillespie, J., 1062 (*App. 38.*) Bungs and bung inserters.
Gillespie, W. H., 559, Tramway carriage breaks.
Girdwood, R., 314, Gas burners.
Glen, G., 176, Railway and tramway rolling stock.
Glover, J., 729, Dry gas meters.
Goddu, L., 1313 (*App. 41.*) Monitors.
Goodman, A., 641, Furnaces.
Goodrich, G. W., 90, Puddling furnaces.
Goodrich, L. S., 90, Puddling furnaces.
Goodwin, C. R., 501, Sewing machines.
Goodwin, W., 630, Two-wheeled carriages.
Gordon, J., 10, Envelopes.
Goreham, W., 665, Cement kilns.
Goueslain, A., 202, Cocks and vent pegs.
Gould, S. L., 769 (*App. 36.*) Paper-making.
Graham, J. C., 13, Cart saddles.
Gratton, T., 466, Railway wheels and tires.
Gravitz, W. J. S., 703, Candles, matches, fire lighters, &c.
Gray, R. B., 1233 (*App. 40.*) Granulators.
Green, T., 747, Heating feed water.
Greenwood, A., 666, Feeding machinery employed in the manufacture of percussion caps, cartridge cases, ferrules, &c.
Greenwood, G., 568, Heating rooms and buildings.
Greenwood, W., 585, Sweeping roads.
Grey, E., 276, Microscopes.
Grieve, T. W., 294, Theatre stages.
Griffith, J., 2170 (*App. 52.*) Steam-boilers.
Grigg, W., 786 (*App. 36.*) Applying electricity to cattle.
Grimm, L., 700, Warming buildings, heating ovens, &c.
Grindrod, J. T., 391, Raising and floating vessels, &c.
Griswold, H. J., 699, Sewing machines.
Griswold, L., 2176 (*App. 52.*) Sewing-machines.
Grout, W. H. J., 463, Carriage wheels.
Grout, W. L., 465, Combination tool.
Guattari, A., 453, Pneumatic telegraphs.
Guernsey, J. W., 1352 (*App. 42.*) Shearing animals.
Guerrero, A., *Comte de St. Ange*, 2184 (*App. 52.*) Horse-shoes.
Gumpel, C. G., 9, Lowering ships' boats.
Gutensohn, A., 258, Obtaining salt of tin and products from waste or refuse tin plate.
Hadwen, J. W., 417, Mordanting, dyeing and printing; 470, Spinning.
Haggett, W., 1461 (*App. 43.*) Metals.
Haight, H. J., 966 (*App. 38.*) Artists' scrapers.
Hale, E., 264, Rolling metals.
Haley, S., 323, Treating hides and skins.
Haley, S. H., 323, Treating hides and skins.
Halfpenny, G. W., 262, Ink, incombustible paper, envelopes and books.
Hall, J. H., 26, Grinding corn.
Halmshaw, D., 586, Fire-places, ovens and boilers.
Hambruch, G., 416, Railway carriages.
Hamilton, E. C., 187, Manure.
Hamilton, J. B., 387, Organ reed pipes.
Hammond, H. W., 2686 (*App. 7.*) Gunpowder pile driver.
Hampton, T., 842 (*App. 37.*) Armour plates.
Hannart, L., 397, Ticketing shop goods, &c.
Harding, G. E., 2064 (*App. 50.*) Furnaces.
Hargreaves, J., 680, Sulphate of soda and sulphate of potassa.
Harlow, B., 480, Stench traps and grids.
Harmer, T., 335, Cleaning glass roofs.
Harris, W. R., 419, Shuttle tops.
Harrison, B., 32, Mechanical motive-power.
Harrison, C., 121, Umbrellas, parasols and sunshades.
Harrison, C. W., 1, Air-gas; 435, Air-gas; 528, Obtaining oxygen.
Harrison, W. W., 577, Knives and forks.
Hart, G. W., 315, Steam-boilers; 741, Fire grates.
Hartley, R., 81, Singeing yarn.
Hartsuff, J. H., 2649 (*App. 6.*) Steam pumps.
Harwood, I. K., 967 (*App. 38.*) Pumps.
Haseltine, G., 13, Cart saddles; 77, Hospital beds; 126, Projectiles; 128, Rolling metals; 213, White lead; 233, Washers; 259, Dressing millstones; 303, Hinges; 326, Converting cast iron into steel; 351, Torpedo launches; 459, Hoes; 516, Adjusting screw propellers and rudders; 681, Economising fuel; 806 (*App. 36.*) Lamps; 932 (*App. 37.*) Casting metals; 967 (*App. 38.*) Pumps; 1250 (*App. 40.*) Elevating apparatus; 1352 (*App. 42.*) Shearing animals; 1517 (*App. 44.*) Railway carriage-couplings; 1622 (*App. 45.*) Paper bags; 1641 (*App. 45.*) Separating liquids and substances; 2064 (*App. 50.*) Furnaces; 2212 (*App. 52.*) Sewing-machines; 2255 (*App. 1.*) Valves; 2257 (*App. 1.*) Inhaling apparatus; 2270 (*App. 1.*) Railway watering columns; 2284 (*App. 1.*) Weaving; 2287 (*App. 1.*) Reaping and mowing; 2311 (*App. 1.*) Distilling turpentine; 2353 (*App. 2.*) Tanning; 2354 (*App. 2.*) Rotary engines; 2600 (*App. 5.*) Preparing and packing water colors; 2761 (*App. 8.*) Obtaining solvent by the distillation of crude turpentine.
Hatfull, R., 281, Preventing and removing incrustation in steam-boilers.
Hawkins, J. G., 220, Gas.
Haworth, G., 662, Aqueous apparatus for producing vapor.
Haycock, S. H., 126, Projectiles.
Hayek, —, 310, Artificial stone.
Hays, J. J., 437, Centrifugal hydro-extracting apparatus.
Hays, W. B., 437, Centrifugal hydro-extracting apparatus.

H.

- Haas, B., jun.*, 2231 (*App. 52.*) Dial indicators for carriages.
Hadfield, R., 1787 (*App. 46.*) Wheels, axles, shafts.

- Hayward, W. F., 2050 (*App. 6.*) Iron safes and fastenings.
 Heaton, R. G., 388, Fishing reels.
 Hedges, K. W., 436, Steam-boilers and engines.
 Hemingway, J., 297, Railway keys and wedges.
 Henderson, A. C., 591, Filters; 1644 (*App. 45.*) Hydro-caloric motors; 1645 (*App. 4.*) Fettling furnaces.
 Henley, T. F., 212, Meat extract.
 Henley, W. T., 254, Puddling furnaces.
 Henry, M., 33, Water gauges; 650, Treating marine plants; 651, Carding engines; 667, Sugar.
 Henson, H. H., 191, Shaping and punching iron.
 Herrick, S. K., 2185 (*App. 52.*) Sewing-machines.
 Hersey, C. H., 1233 (*App. 40.*) Granulators.
 Hersey, F. C., 1233 (*App. 40.*) Granulators.
 Hewett, S. B., 1793 (*App. 46.*) Fire-places.
 Heyne, J. F. C., 425, Kilns.
 Heyworth, E., 1890 (*App. 48.*) Steam-boilers.
 Hidden, T. B., 2600 (*App. 5.*) Preparing and packing water colors.
 Highton, H., 85, Electric telegraphs; 545, Electric telegraphs.
 Hill, J., 583, Stove grates.
 Hillmann, J. H., 90, Puddling furnaces.
 Hindley, G., 178, Dressing stone.
 Hinds, E. C., 282, Preventing accidents on railway platforms.
 Hipkins, E., 165, Iron safes.
 Hitchcock, R., 356, Lamps.
 Hodges, R., 781 (*App. 9.*) Butt hinges.
 Hodges, S. H., 1380 (*App. 42.*) Boots and shoes.
 Hodson, H. F., 93, Agricultural and horticultural implements.
 Hoey, T., 712, Water waste preventers; utilising excremental matters, &c.
 Holding, J., 419, Shuttle tips.
 Hollingworth, J., 1464 (*App. 43.*) Weaving.
 Holman, S., 115, Gas retort mouthpieces, lids and fasteners; 136, Raising and lowering gas purifier lids, &c.
 Holmes, J. E., 98, Centrifugal machines and kilns.
 Holt, T. M., 531, Tables.
 Hookham, G., 240, Metallic box fastenings.
 Hookham, H. J., jun., 240, Metallic box fastenings.
 Hopkinson, J. T., 181, Window fasteners.
 Horner, G., 188, Spinning.
 Horrocks, J., 690, Boiling, scouring and cleansing textile fabrics and materials.
 Horsley, T., jun., 204, Closing cartridge cases.
 Hosking, J., 343, Safety valves.
 Hough, E. J., 659, Life boats.
 Howard, E. I., 2255 (*App. 1.*) Valves.
 Howe, W. H. I., 1428 (*App. 4.*) Fruit preserving cans, &c.
 Howlett, E. J., 1622 (*App. 45.*) Paper bags.
 Huch, E. H., 288, Soup farina.
 Hugall, C. E., 177, Window fasteners.
 Hughes, E. T., 63, Towing canal boats; 321, Combinations of textile threads; 700, Warming buildings, heating ovens, &c.
 Hughes, P., 96, Dishes and plates.
 Humber, J., 662, Aqueous apparatus for producing vapor.
 Hunt, B., 40, Printing telegraphs; 425, Kilns.
 Hunt, S., 142, Building blocks.
 Hunter, C. D., 2257 (*App. 1.*) Inhaling apparatus.
 Huntington, F. A., 1753 (*App. 46.*) Steam boilers and furnaces.
 Hutchings, A. J. H., 588, Pickling.
 Hutchinson, J., 1464 (*App. 43.*) Weaving.
 Hutchison, D., 551, Removing and preventing incrustation in boilers.
 Huxtable, J., 363, Turn-wrest ploughs.
- I.
- Ibbetson, J., 378, Leather.
 Imray, J., 309 Steam-boilers; 325, Heating, evaporating, distilling, &c.
 Intyre, P. Mc, 424, Sharpening chisels, &c.
 Ireland, W., 263, Wheel tyres.
 Ivory, J. H., 717, Reducing "Val de Travers" rock and other like mineral substances to powder.
- J.
- Jackson, J., 595, Attaching discs to ropes and preventing the slipping of ropes in passing over or round drums.
 Jackson, W., 338, Heating feed water.
 Jacobsen, F., 266, Manure.
 James, J. H., 456, Ornamenting fabrics.
 Janney, E. H., 1517 (*App. 44.*) Railway carriage-couplings.
 Jarman, H., 164, Steering ships.
 Jasper, C. E. F., 407, Cigars.
 Jaynor, A., 66, Steering and hoisting.
 Jeffs, J., 527, Ironing and glazing textile fabrics, paper, &c.
 Jelley, R. S. C., 271, Cutting tenons.
 Jensen, P., 149, Printing telegraphs; 602, Coke ovens and utilising heat; 2650 (*App. 6.*) Railroad rails.
 Jewitt, H., 55, Toys.
 John, W. H. St., 2527 (*App. 4.*) Purifying gas.
 Johnson, A. F., 371, Fire alarm and water supply apparatus.
 Johnson, J. H., 18, Spinning; 43, Transmitting power; 155, Fire-arms; 247, Railway signals; 305, Manure; 319, Self-setting animal traps; 356, Lamps; 405, Liquid fuel; 406, Tin foil; 443, Combined pencil and eraser; 521, Automatic regulating valves; 522, Lawn mowers; 557, Nut blanks; 721, Railway carriage dust screens; 733, Ginning cotton; 734, Ginning cotton; 1234 (*App. 40.*) Steam-engines; 1947 (*App. 48.*) Speed indicators; 2061 (*App. 50.*) Casting metals.
 Johnson, J. O., 2342 (*App. 2.*) Fluid meters.
 Johnson, W., 730, Fire grates, heating boilers, &c.
 Johnston, J. B., 2650 (*App. 6.*) Railroad rails.
 Johnstone, J., 524, Ploughs.
 Jones, D., 372, Forcing inflammable fluid and liquid into furnaces.
 Jones, E., 386, Cartridges.
 Jones, F. L., 298, Weaving.
 Jones, H., 187, Manure.
 Jones, J. S., 283, Basting meat.

Jones, R., 451, Safety lamps.
 Jones, R. C., 271, Cutting tenons.
 Jones, S. B., 261, Railway carriages and platforms.
 Jones, W., 118, Valves.
 Joseph, J., 440, Brooches and bouquet holders.
 Joslin, W., 341, Furnaces.
 Juengling, H., 807 (App. 8.) Air-gas.
 Jukes, R., 736, Reverberating furnaces or cupolas.
 Justice, P. S., 2686 (App. 7.) Gunpowder pile driver.

K.

Kalmar, A., 5, Compasses.
 Kay, T. B., 379, Carding engines.
 Keighley, J., 657, Raising beer and other liquids.
 Kenyon, J., 482, Drying yarns and fabrics.
 Kenyon, J. H., 482, Drying yarns and fabrics.
 Kercado, G. T. de, 104, Water meters.
 Kershaw, H., 549, Spinning.
 Kesterton, H., 53, Rolling metals; 54, Metal telegraph posts; 253, Steam-boilers.
 Kidd, J., 520, Heating steam-boilers.
 King, J., 467, Railway platforms; 468, Repairing propeller shafts at sea.
 King, J. A., 116, Peat-fuel.
 King, J. M., 467, Railway platforms; 468, Repairing propeller shafts at sea.
 King, T. D. M., 467, Railway platforms; 468, Repairing propeller shafts at sea.
 Kininmonth, J., 102, Bakers' ovens.
 Kirkham, G. B., 444, Treadle motions.
 Kirkman, J., 200, Governors.
 Kitson, G. L., 521, Automatic regulating valves.
 Knaggs, W., 488, Fire-places.
 Knevet, A., 438, Fire grates.
 Knight, E., 806 (App. 36.) Lamps.
 Knight, J., 234, Umbrellas, parasols and sunshades.
 Knoblauch, C., 2752 (App. 8.) Furnace grates.
 Knowles, C. B., 719, Regulating the blast of locomotive engines.
 Knowles, M., 105, Weaving.
 Kolb, A., 316, Ventilating closets, &c.
 Konn, S. W., 91, Electrical heat.
 Körting, E., 626, Steam jet apparatus and air condensers.
 Krausse, H., 80, Air-gas.
 Krieb, F., 1584 (App. 44.) Printing telegraphs.
 Kuhlmann, F., 847 (App. 9.) Utilising acid residues in the manufacture of chlorine.
 Kux, A., 422, Steam-boilers.

L.

La Rue, F. A. H., 930 (App. 8.) Separating magnetic from non-magnetic substances and especially magnetic oxyd of iron from all foreign material.
 La Rue, W. W. de, 639, Marking or scoring games.
 Laak, L. Van, 1062 (App. 38.) Bungs and bung inserters.
 Labarre, E. de, 321, Combinations of textile threads.
 Lacon, W. S., 186, Lowering ships' boats.

Lafargue, A., 458, Oil-gas.
 Lake, W. R., 26, Grinding corn; 27, Cleaning horses; 79, Thread spools; 80, Air-gas; 127, Pipe-joints, elbows or couplings; 225, Fireproof vaults; 226, Fireproof safes; 227, Boots and shoes; 279, Railway breaks; 290, Refrigerating; 300, Clothes wringers; 317, Breakwaters; 371, Fire alarm and water supply apparatus; 396, Treating middlings; 441, Railway electrical breaks; 452, Valves; 454, Valves; 473, Heating steam-boilers; 540, Sewing sails, tents, tarpaulins, awnings, &c.; 558, Drilling and boring; 560, Blast furnaces; 634, Apparatus for burning liquid fuel; 635, Steam-boilers and furnaces; 719, Regulating the blast of locomotive engines; 727, Roller journal boxes; 1283 (App. 7.) Sewing-machines; 1737 (App. 46.) Veneers; 1770 (App. 1.) Traction-engines.
 Lamb, J. G., 340, Spinning.
 Lamb, J. W., 73, Knitting machines.
 Lancaster, G., 639, Marking or scoring games.
 Lancaster, R., 442, Gas regulators; 714, Furnaces.
 Lanier, G. P., 130, Mattresses.
 Larman, F. W., 2481 (App. 4.) Tuyeres.
 Lartigue, H., 247, Railway signals; 490, Railway signals.
 Larue, J., 172, Printing.
 Latham, B., 331, Manure.
 Laurette, L., 368, Artificial stone.
 Lavillasse, de, 650, Treating marine plants.
 Law, J., 71, Carding-engines.
 Law, S., 71, Carding-engines.
 Lawrence, C., 510, Washing and cleansing clothes, &c.
 Lawrence, F. L., 510, Washing and cleansing clothes, &c.
 Laycock, T., 1078 (App. 39.) Sewing-machines.
 Lea, W., jun., 566, Roller blind movements or furniture.
 Leach, G., 357, Preparing and carding wool; 358, Sea fishing; 359, Preparing wool.
 Leatham, W., 30, Valves.
 Lecœur, E. J. J., 651, Carding engines.
 Lee, H., 2287 (App. 1.) Reaping and mowing.
 Lee, H. M., 493, Preserving ferns, plants, and grasses.
 Lee, J. A., 695, Boiling fibres for paper making and treating the waste leys.
 Lee, J. H., 594, Steam-boilers and engines.
 Lee, R. B., 190, Metal telegraph posts.
 Leech, W., 2567 (App. 5.) Preserving wood from the ravages of insects.
 Leeming, J., 693, Pickers used in looms for weaving.
 Leeming, T., 46, Bronzing and coloring paper, &c.
 Leigh, E. A., 738, Carding engines.
 Leigh, J. S., 15, Aërial tramways.
 Leon, W. F., 2057 (App. 50.) Hydraulic hoists.
 Levy, G. S., 433, Lining straw board, &c.
 Lewis, D., 494, Sizing and dressing machines.
 Lewis, H., 322, Boots and shoes.
 Lewis, J., 575, Fire grates and ovens.
 Liebert, J., 701, Substitute for coffee.
 Lightbody, W. M., 698, Breaks.
 Lightowler, J., 617, Kitchen ranges.
 Lister, T., 688, Raising beer and other liquids.
 Lloyd, R., 2311 (App. 1.) Distilling turpentine; 2761 (App. 8.) Obtaining solvent by the distillation of crude turpentine.
 Loddell, G. G., 2061 (App. 50.) Casting metals.

Lodighin, A. N., 91, Electrical heat.
Longworth, T., 298, Weaving.
Loo-Wauters, F. Van, 63, Towing canal boats.
Loryea, A. M., 217, Hydraulic motive-power.
Lowe, O., 36, Steam-boilers.
Lowe, S., 73, Knitting machines.
Luxton, C., 999 (*App. 7.*) Peat machines.
Lynde, F. G., 46, Bronzing and coloring paper, &c.
Lyne, T., 380, Moulding bricks.
Lyon, R., 523, Railway communicating apparatus.
Lyttle, W. A., 52, Roofs, floors and pavements;
 158, Railway chairs.

M.

Maardt, J. G., 602, Coke ovens and utilising heat.
McBride, T., 579, Gold and silver cord.
McCarty, B. F., 681, Economising fuel.
McClean, F., 41, Raising ships.
McClure, W. B., 13, Cart-saddles.
McDougall, A., 542, Treating stable manure.
McDougall, J., 393, Manure.
McEvoy, C. A., 740, Elastic fuses.
McFethries, J., 725, Cutting internal screw threads.
McIntyre, P., 424, Sharpening chisels, &c.
McWilliams, A. S., 2005 (*App. 49.*) Sheep shears.
Macaulay, H., 92, Fire-arms.
Macdermott, M., 679, Perforating rock, &c.
Mackie, S. J., 445, Explosive compounds.
Macneill, Sir J., 206, Tramways and carriages.
Macneill, R., 184, Pavements.
Maitre, E., 2010 (*App. 49.*) Covering surfaces with wood.
Malpas, W., 2567 (*App. 5.*) Preserving wood from the ravages of insects.
Mamelzer, T., 397, Ticketing shop goods, &c.
Manbré, A., 2, Valves.
Maquay, S. W., 450, Gas retorts; 511, Manure.
Marchand, I. F. B., 375, Blocking boots.
Margueritte, L. J. F., 682, Purifying syrups and sugar.
Markham, R. J., 345, Wheels.
Marquez, P., 317, Breakwaters.
Marshall, C., 601, Thrashing machines.
Marshall, H. D., 601, Thrashing machines.
Marshall, J., 601, Thrashing machines.
Marsland, E., 592, Land rollers.
Marsters, S., 536, Cooling beer and other liquids;
 737, Cooling beer and other liquids.
Martin, B. G., 486, Presses; 1148 (*App. 39.*) Presses.
Martin, C., 174, Spinning.
Martin, R. E. R., 642, Artificial fuel.
Martin, S., 697, Moulds for casting ingots.
Martin, S. B., 290, Refrigerating.
Martin, W. G., 642, Artificial fuel.
Marval, H. C., 398, Fire-arms; 413, Fire-arms.
Mason, F. H., 681, Economising fuel.
Masourine, M. S., 207, Caissons.
Masson, J. B. F., 406, Tin foil.
Mathelin, P. L., 409, Water meter and other cocks.
Matthews, C., 264, Rolling metals.
Matthews, W. J., 138, Fire-arms.
Mayers, H., 2057 (*App. 50.*) Hydraulic hoists.

Meakin, G. F. L., 1179 (*App. 49.*) Hanging sashes and shutters.
Mellor, W., 546, Smoothing and pressing textile fabrics.
Mellor, W. W., 132, Cutting glass.
Mercer, J., 647, Weaving.
Metge, E., 710, Preserving meat.
Mewburn, J. C., 409, Water meter and other cocks;
 410, Lubricating.
Meylert, A. P., 213, White lead.
Michaud, P. F., 629, Axle-boxes.
Michelet, J. C., 403, Converting a slow alternate circular motion into a rapid continuous motion.
Mickle, W., 803 (*App. 36.*) Smelting and puddling iron; 921 (*App. 37.*) Economising fuel; 1656 (*App. 45.*) Economising fuel.
Middlehurst, James, 346, Potato and other root gatherers, &c.
Middlehurst, John, 346, Potato and other root gatherers, &c.
Middlemass, J., 306, Clerical costumes.
Milburn, J., 483, Chimney cowl.
Milné, C. F., 706, Electric clocks.
Miller, E., 2689 (*App. 7.*) Railway carriages.
Miller, S. H., 19, Dies.
Miller, T. W., 571, Fire-arms.
Mills, B. J. B., 431, Screw propellers.
Mills, F., 379, Carding engines.
Mills, J. H., 1924 (*App. 48.*) Steam-boilers and engines.
Mills, J. L., 123, Printing.
Milner, E., 196, Lubricating.
Minshall, W., 603, Felting hat bodies, &c.
Mirfield, M., 423, Combing fibres.
Mitchell, J., 718, Harvesting and chaff cutting machine knives.
Molyneux, E. L., 2600 (*App. 5.*) Preparing and packing water colors.
Monkhouse, T. S., 123, Printing.
Montgomery, J. A., 620, Journal boxes.
Moody, C., 2023 (*App. 49.*) Locks.
Mooney, J. H., 1283 (*App. 7.*) Sewing-machines.
Moorhouse, J., 574, Fire ranges.
Morand, A., 411, Kilns.
Morgan-Brown, W., 612, Weaving; 687, Carding engines; 822 (*App. 36.*) Boots and shoes; 1233 (*App. 40.*) Granulators; 1901 (*App. 48.*) Hydraulic hose.
Morris, E. R., 29, Chartometers.
Morris, T. Shewell, 394, Furniture casters.
Morris, T. Southern, 797 (*App. 9.*) Preparing, spinning and doubling fibres.
Morton, J., 568, Heating rooms and buildings.
Motay, C. M. T. du, 328, Baryta.
Muirhead, L. P., 244, Speed indicators.
Murdoch, H. H., 360, Explosive compounds.
Myers, A. G., 127, Pipe-joints, elbows or couplings.
Myers, S., 512, Stove grates.

N.

Nangle, W. C., 495, Paints.
Napier, J., 246, Excavating under water.
Nasmith, J., 674, Spinning.
Naylor, M., 167, Weaving.

ham, J., 31, Fire-arms and cartridges.
 ey, J. S., 431, Screw propellers.
 W., 2067 (*App.* 50.) Distilling spirituous
 uors.
 , J., 377, Forming sugar into blocks.
 omb, W., 967 (*App.* 38.) Pumps.
 ell, L. D., 503, Ships' berths and sofas.
 ell, W., 514, Ornamenting tin-plate articles.
 on, A. V., 20, Paper-ruling machines; 257,
 eam vacuum pumps; 444, Treadle motions;
 3, Extension ladders; 608, Printing presses;
 6, Electric clocks.
 on, W. E., 19, Dies; 28, Musical instru-
 ments; 89, Waterwheels; 90, Puddling fur-
 ces; 256, Fire-arms; 340, Spinning.
 ols, F. W., 303, Hinges.
 ols, J., 215, Ventilating waterclosets, &c.
 olson, J., 731, Railway buffers.
 olson, T. B., 731, Railway buffers.
 l, J., 539, Sulphurated lead.
 e, G., 607, Paper pulp.
 an, J., 135, Clipping animals.
 is, J., 504, Mathematical drawing instruments.

O.

noghue, J. D., 2420 (*App.* 3.) Tooth brushes.
 noghuc, W., 2420 (*App.* 3.) Tooth brushes.
 now, J., 24, Lace-making.
 P. F., 681, Economising fuel.
 , G., 338, Heating feed water.
 , C. H. G., 149, Printing telegraphs.
 rdonk, J. P., 1622 (*App.* 45.) Paper bags.
 rn, S., 313, Forging metals.
 rne, D. T., 198, Self-feeding air-tight stoves.
 rne, J. W., 1947 (*App.* 48.) Speed indicators.
 nder, J., 557, Nut blanks.
 i, C., 534, Communicating in trains.
 o, J., 160, Mine shafts and hoists.
 o, W., 583, Stove grates.

P.

ison, H., 193, Breakwaters, docks, piers, &c.
 R. W., 107, Cutting screws.
 t, F. A., 5, Compasses.
 ara, G., 405, Liquid fuel.
 J., 600, Signals.
 er, F. A., 2618 (*App.* 6.) Electro-magnetic
 ines.
 er, R., 198, Self feeding air-tight stoves.
 r, A. J., 535, Printing.
 r-Rhodes, C. E., 173, Illuminating clocks,
 nes, signs, &c.
 n, J., 396, Treating middlings.
 ur, J. T., 25, Cabs and other vehicles; 144,
 eels for carriages.
 tt, G. F., 469, Life rafts.
 tier, A., 295, Clocks.
 ure, E. G., 522, Lawn mowers.
 son, J., jun., 365, Steam traps.
 on, J., 569, Gas, fuel, oil, &c.

Patterson, R. H., 274, Purifying coal gas.
 Payne, A., 666, Feeding machinery employed in the
 manufacture of percussion caps, cartridge cases,
 ferrules, &c.
 Payton, W., 621, Safety and relief valves.
 Peacock, G., 364, Chain cables.
 Pearl, O., 18, Spinning.
 Pearson, W., 121, Umbrellas, parasols and sun-
 shades.
 Peebles, D. B., 7, Gas regulators.
 Pelouze, E. P., 109, Condensing liquefiable matters.
 Pengilly, C., 563, Filters.
 Perkins, C. H., 128, Rolling metals.
 Perman, C. H., 194, Metallic boxes.
 Petersen, C., 1394 (*App.* 42.) Ships' logs.
 Pettifer, C., 395, Ventilating mines, buildings, drains,
 ships, &c.
 Philippi, F., 11, Smelling bottles.
 Picq, H., 43, Transmitting power.
 Pilkington, J., 669, Heating bakers' ovens.
 Pilling, W., 480, Stench traps and grids.
 Pilon, C. C., 637, Pouches, cases, purses, boxes, &c.
 Pinel, M. P. A., 651, Carding engines.
 Pink, R., 263, Wheel tyres.
 Pinker, J., 481, Lowering and raising ships' boats.
 Pitcher, W., 146, Craping hair, &c.
 Pitt, R., 273, Leather.
 Pitt, T., 284, Fire-arms.
 Platt, G., 389, Ornamenting gas fittings, &c.
 Platt, J., 156, Fire-places.
 Plessner, J. M., 180, Lamps.
 Poage, J. N., 2270 (*App.* 1.) Railway watering
 columns.
 Pohl, O. E., 4, Salt.
 Pope, F. L., 1641 (*App.* 45.) Separating liquids and
 substances.
 Porter, B., 201, Weaving.
 Porter, H., 224, Barometers.
 Postle, D., 709, Production of cold for preserving
 food, &c.
 Potter, H. T., 340, Spinning.
 Power, H. L., 152, Umbrellas.
 Prangley, O., 420, Extracting impurities from wool.
 Pratt, W. T. C., 150, Steering ships.
 Preece, W. H., 153, Railway signals.
 Preston, W. R., 187, Manure.
 Prince, A., 446, Packing tobacco, &c.; 461, Dis-
 tributing color upon continuous lengths of paper,
 &c.
 Pringle, C., 594, Steam-boilers and engines.
 Pritchard, G., 106, Metal tubes and bars.
 Procopé, M., 564, Nets.
 Proudfoot, F., 634, Apparatus for burning liquid
 fuel; 635, Steam-boilers and furnaces.
 Prouse, R. S., 366, Axles and axle boxes.
 Prud'homme, P. D., 490, Railway signals.
 Puckle, H. J., 245, Aërial tramways.
 Purdie, J., 233, Washers.
 Purvis, G., 733, Ginning cotton; 734, Ginning
 cotton.

Q.

Quelch, W. B., 141, Heating and ventilating build-
 ings.
 Quimbel, G., 309, Steam-boilers.

Quin, J., 580, India rubber valves.
 Quintavalle, R., 150, Steering ships.

R.

Rainbow, W., 297, Railway keys and wedges.
Ramsden, J. C., 519, Utilising furnace gases.
Randolph, A., 470, Spinning.
Rawle, G., 14, Tanning.
Ray, R., 46, Bronzing and coloring paper, &c.
Raynolds, C. T., 2600 (*App. 5.*) Preparing and packing water colors.
Reckendorfer, J., 443, Combined pencil and eraser.
Redgrave, J., 223, Glass vessels.
Redman, J. G., 732, Preventing the corrosion and the fouling of ships' bottoms and other submerged structures.
Reed, J. H., 1052 (*App. 38.*) Pegging boots and shoes.
Reidy, J., 848 (*App. 8.*) Pickaxes.
Reynolds, J., 489, Guiding railway engines and carriages.
Reynolds, J. H., 489, Guiding railway engines and carriages.
Rhodes, C. E. P., 173, Illuminating clocks, names, signs, &c.
Rhodes, J. H., 382, Liqueur stands.
Rich, A., 2600 (*App. 5.*) Preparing and packing water colors.
Richards, W., 518, Charging and drawing retorts.
Richardson, G., 684, Artificial marble, stone, cement, substitute for leather, mixing paints, &c.
Richardson, J., 370, Furnaces.
Richardson, J. T. H., 676, Glass tumblers, goblets, &c.
Richardson, L., 2600 (*App. 5.*) Preparing and packing water colors.
Rickard, S., 616, Fire-places.
Riley, E., 254, Puddling furnaces.
Rippin, E. C., 2108 (*App. 51.*) Signals.
Ritchell, C. F., 558, Drilling and boring.
Ritchie, W., 584, Screw presses.
Roberts, L., 94, Railway rails.
Robertson, James, 448, Motive-power and blowing engines.
Robertson, John, 248, Forcing, exhausting and measuring air, gas, &c.; 708, generating and applying heat.
Robey, J., 230, Purifying, disinfecting and deodorising.
Robinson, J., 673, Sawing wood.
Robinson, T., 680, Sulphate of soda and sulphate of potassa.
Robinson, W., 67, Signals.
Rochussen, T. A., 562, Iron and steel.
Roddis, J., 460, Chimney cowl.
Rogé, H. N., 237, Railway switches and points.
Rogers, H., 129, Carriages.
Rogers, J. B., 491, Signals.
Rogers, S. A., 190, Metal telegraph posts.
Rolin, E., 605, Weighing machines.
Rosa, W. V. V., 356, Lamps.
Rose, H. C., 255, Horse shoes.
Rose, W. W., 55, Toys.
Rosenfield, A., 2057 (*App. 50.*) Hydraulic hoists.
Ross, J., 2238 (*App. 52.*) Sewing boots and shoes.
Ross, L. E., 2284 (*App. 1.*) Weaving.

Roturier, J., 101, Turning the leaves of music books.
Rowbotham, S., 684, Artificial marble, stone, cement, substitute for leather, mixing paints, &c.
Rowland, T. F., 1287 (*App. 41.*) Gas retorts.
Roy, J., 400, Umbrellas and parasols.
Rue, F. A. H. la, 930 (*App. 8.*) Separating magnetic from non-magnetic substances and especially magnetic oxyd of iron from all foreign material.
Rue, W. W. De la, 639, Marking or scoring games.
Rushton, T. H., 797 (*App. 9.*) Preparing, spinning and doubling fibres.
Rutenberg, Baron V. de, 360, Explosive compounds.
Rydl, G., 82, Drying-machines; 229, Dyeing, staining and drying animal and vegetable substances, &c.; 329, Steam-boilers, furnaces, motive-power, &c.; 376, Economising fuel, heating feed water, &c.; 691, Steam-engines and boilers.
Rylands, J., 817 (*App. 4.*) Straightening, measuring and cutting wire and metal rods.
Ryle, J., jun., 2332 (*App. 2.*) Refrigerators.

S.

Salleron, J., 509, Corks.
Salmon, P., 147, Gas, oil-gas engines and boilers.
Samain, P., 1944 (*App. 48.*) Fire-arms.
Sambrook, W., 596, Heating feed water.
Sanders, F., 625, Communicating in trains and warming railway carriages.
Sanders, R. D., 625, Communicating in trains and warming railway carriages.
Sault, J., 2504 (*App. 4.*) Spreading silk.
Saunders, J. E., 719, Regulating the blast of locomotive engines.
Savignon, L. A. A. de, 667, Sugar.
Saville, T., 568, Heating rooms and buildings.
Sawyer, A. F., 217, Hydraulic motive-power.
Sawyer, W. H., 1641 (*App. 45.*) Separating liquids and substances.
Scheidecker, C., 661, Shearing animals.
Schenck, —, Bart., 310, Artificial stone.
Schlesinger, W. J., 464, Stoning raisins; 465, Combination tool.
Schmidt, H., 88, Marking timber, &c.
Schoevers, A. T. C., 84, Trusses for hernia.
Schofield, J., 546, Smoothing and pressing textile fabrics.
Scholefield, R., 170, Brick making.
Schwarz, L., 2218 (*App. 52.*) Economising fuel.
Schwarzenbach, V., 208, Gilding on glass.
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Bonnevillie (*Warth*), 1572 (*App. 44.*)
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Clark (*Levy*), 433.
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Cylinders and rollers for printing:

Stroudley & Drummond, 8.
Mills & Monkhouse, 123.
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